

Make clickers work for you...



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Upcoming travel to: SF Bay Area, LA, W. Virginia U., Pittsburgh, Chicago



THERE IS A POLL OPEN.
*Do you see it? If not, select
“polling” from the dropdown
menu on your toolbar.*

*There are **handouts** for this session that may be
helpful at blog.sciencegeekgirl.com
(see “presentations” tab)*

***Technical
Difficulties?***

Contact
1-866-229-3239

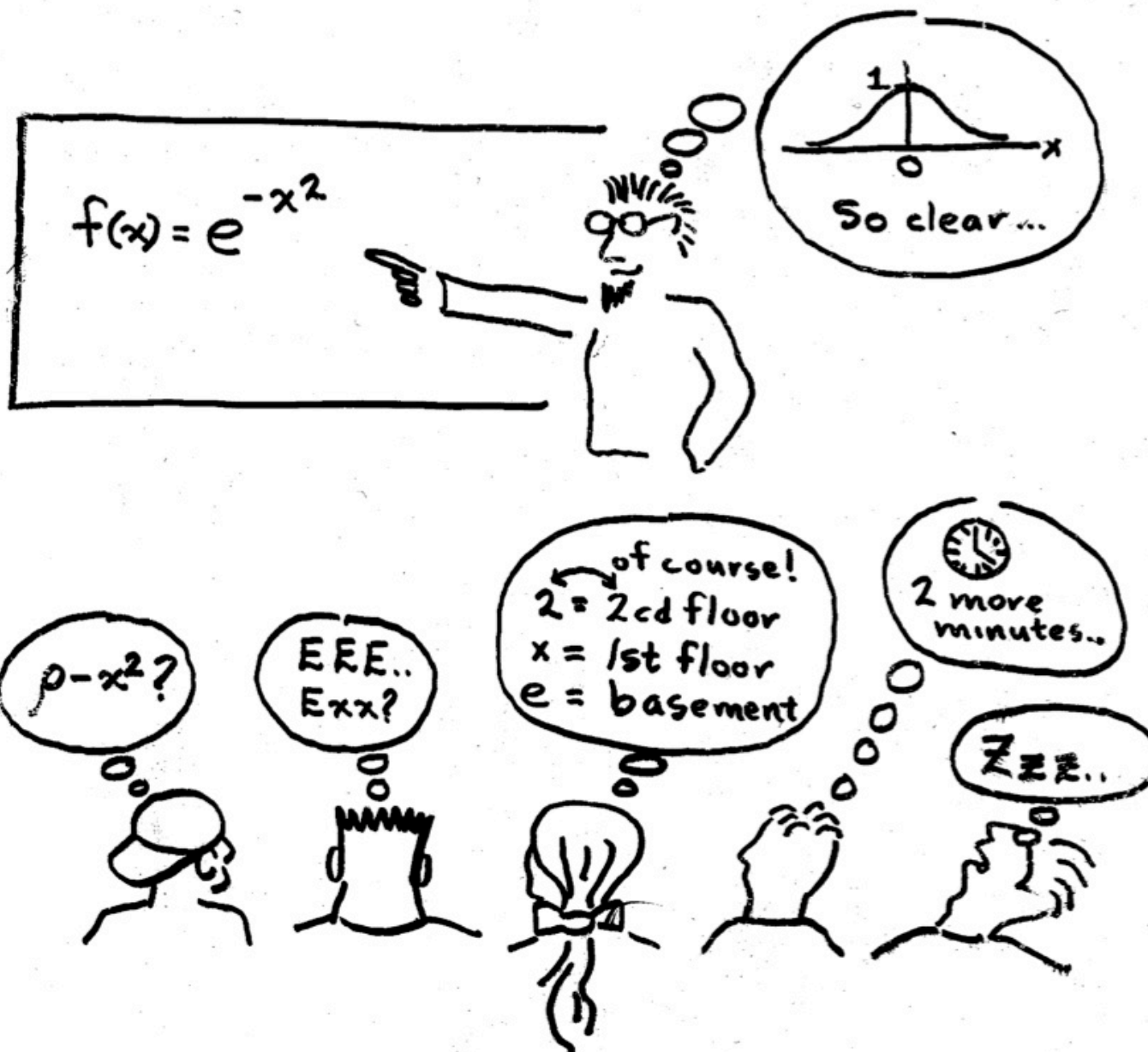
Sponsored by i>clicker/Panopto

Why question?

2

- How many times have you given a lecture and found that students hadn't followed you?
- Can you rely on students to ask questions if they don't understand something?
- Can you rely on students to *know* if they don't understand something?
- What *are* the benefits of questioning?

Credit: Rosie Piller



Introducing Me

4

Science Education Initiative

<http://colorado.edu/SEI>

Applying scientific principles to improve science education – What are students learning, and which instructional approaches improve learning?



Physics Education Research Group

<http://PER.colorado.edu>

One of largest PER groups in nation, studying technology, attitudes, classroom practice, & institutional change.



Blogger & Consultant

<http://sciencegeekgirl.com>



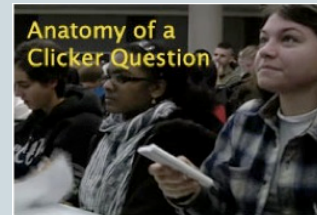
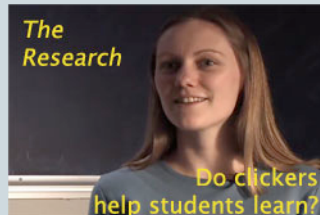
U. Colorado clicker resources...

5

Videos of effective use of clickers

2-5 mins long

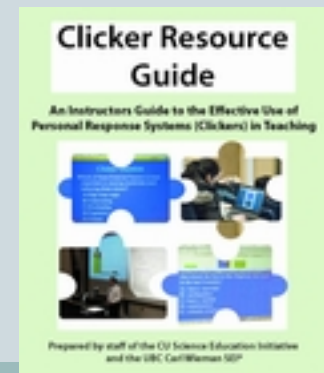
<http://STEMvideos.colorado.edu>



Clicker resource page

<http://STEMclickers.colorado.edu>

- Instructor's Guide
- Question banks
- Workshops
- Literature / Articles



And thanks to our sponsors today...

| The Active Class |

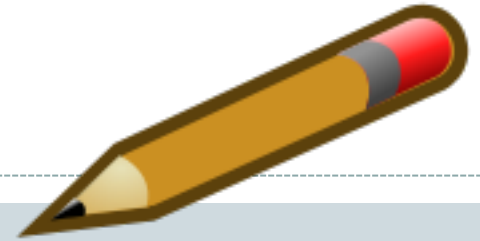
The Active Class is a multi-author blog that provides a forum for educators to exchange ideas about teaching and learning with technology. Visit us at

[*www.theactiveclass.com.*](http://www.theactiveclass.com)

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Agenda



1. What are the basic **steps** in using clickers with peer instruction?
2. **Why does it work** (ie., the research)?
3. What makes a **good question**?
4. How do we **facilitate student discussions**?

*There are **handouts** for this session that may be helpful at blog.sciencegeekgirl.com (see “presentations” tab)*

Why question?

8

- How many times have you given a lecture and found that students hadn't followed you?
- Can you rely on students to ask questions if they don't understand something?
- Can you rely on students to *know* if they don't understand something?
- What *are* the benefits of questioning?

If questioning is so great, why don't we do it more?

Credit: Rosie Piller

When can we ask questions?

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BEFORE

Setting up instruction

Motivate
Discover
Predict outcome
Provoke thinking
Assess prior knowledge



DURING

Developing knowledge

Check knowledge
Application
Analysis
Evaluation
Synthesis
Exercise skill
Elicit misconception



AFTER

Assessing learning

Relate to big picture
Demonstrate success
Review or recap
Exit poll

Credit: Rosie Piller and Ian Beatty.

How can we ask questions?

10

- Ask rhetorically
- Target the class (how?)
- Target someone in particular
- Wait and then... (call on whom?)
- Answer your own question
- Leave the question unanswered

Or ask out of class

- Blogs
- Discussion boards
- Homework...

Credit: Rosie Piller

The toughest thing about asking questions in class is...



- A. Writing good questions
- B. Getting students to really think about them
- C. Getting students to answer the questions / Nobody responds
- D. The same students always respond / Not everybody responds
- E. It takes too long / I have a lot of content to cover

Clickers are a tool for questioning

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But not a magic bullet!

How is a clicker question the same or different?*

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- Similar in terms of goals
 - Multiple choice
 - Anonymous (to peers)
 - Every student has a voice – the loud ones and the shy ones
 - Forced wait time
 - You can withhold the answer until everyone has had time to think (choose when to show the histogram)
- * From other types of in-class questions

CHAT DISCUSSION

Poll: Why do you want to use clickers?



What does this tool help us to do?

Which of these could be clicker questions?

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BEFORE

Setting up instruction

Motivate
Discover
Predict outcome
Provoke thinking
Assess prior knowledge



DURING

Developing knowledge

Check knowledge
Application
Analysis
Evaluation
Synthesis
Exercise skill
Elicit misconception



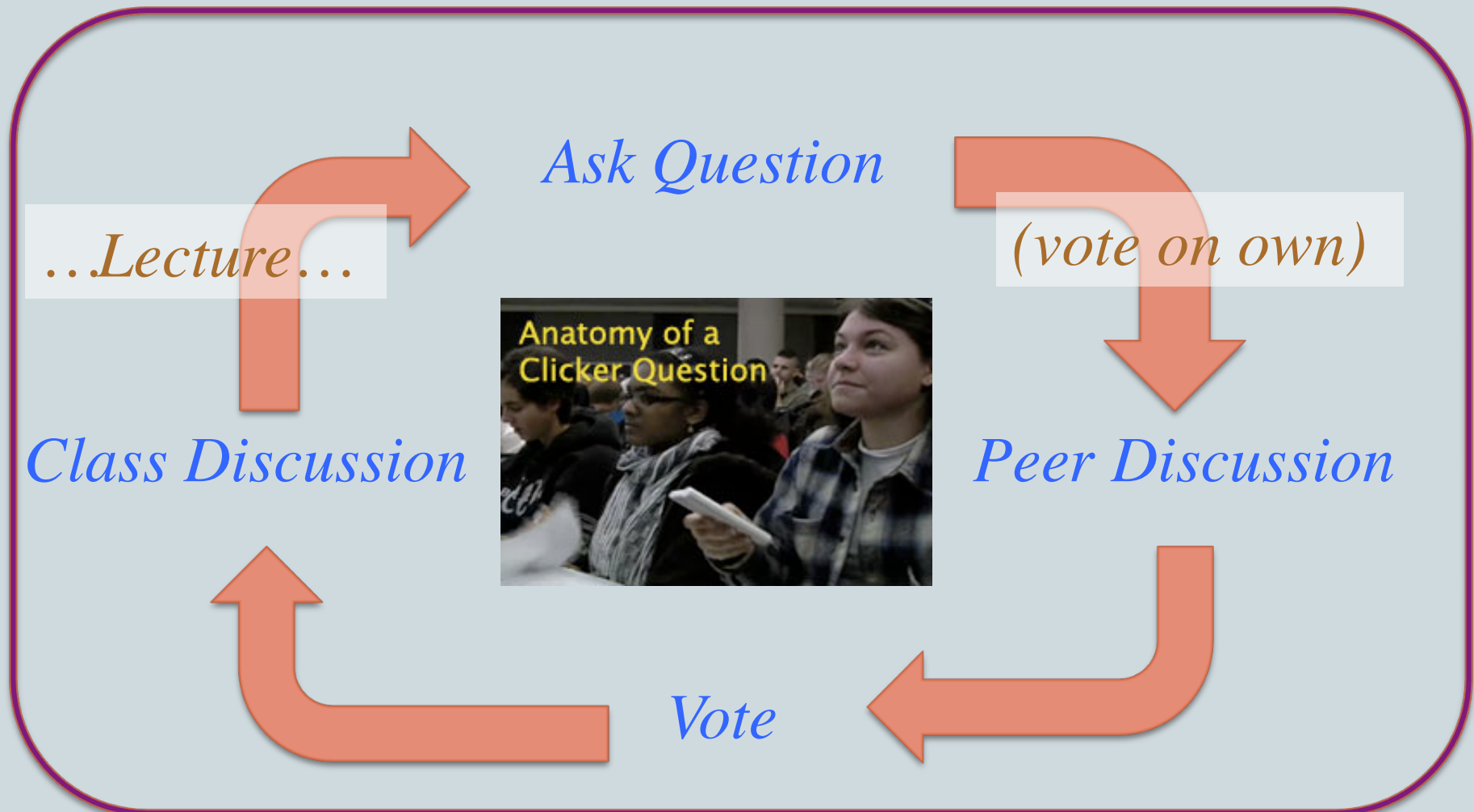
AFTER

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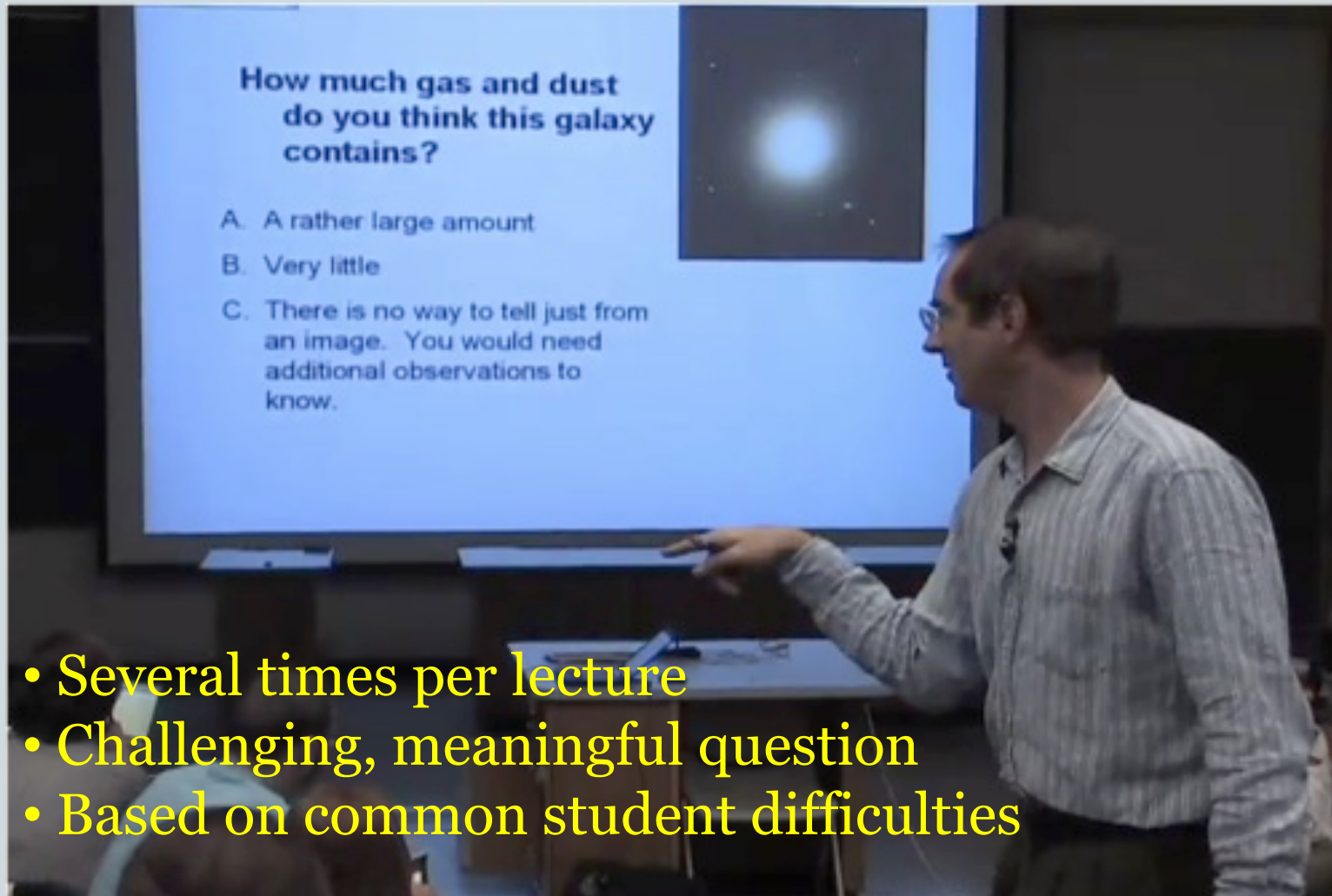
Anatomy of Peer Instruction

15



1. Ask Question

16



- Several times per lecture
- Challenging, meaningful question
- Based on common student difficulties

2. Peer Discussion

17



- Students learn more deeply by teaching each other
- Makes them articulate answer
- Lets you see inside their heads

3. Vote

18



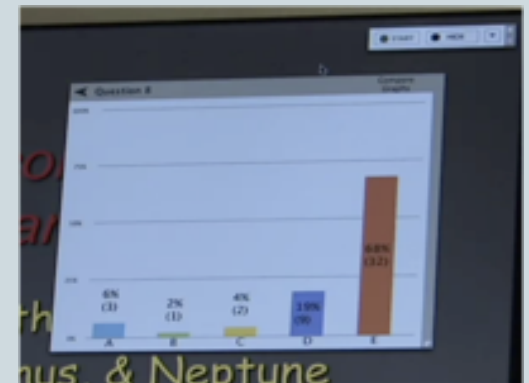
- Typically allow 2-5 minutes
- When buzz in room dies down, or
- When about 75% of students have clicked in.

4. Wrap-Up Discussion

19



- Ask students to defend their answers
- Emphasize reasoning



A few technical comments: Grading



Motivate students to participate, without stressing over the right answer

We recommend **extra credit** for:

- **Mostly participation** (eg., 2 points)
- **Some for correctness** (eg., 1 point)

A new research study (*James & Willoughby, 2001*) **shows:**
Giving points for correctness creates less productive classroom conversations! See <http://theactiveclass.com>

A few technical comments: Timing / Groups

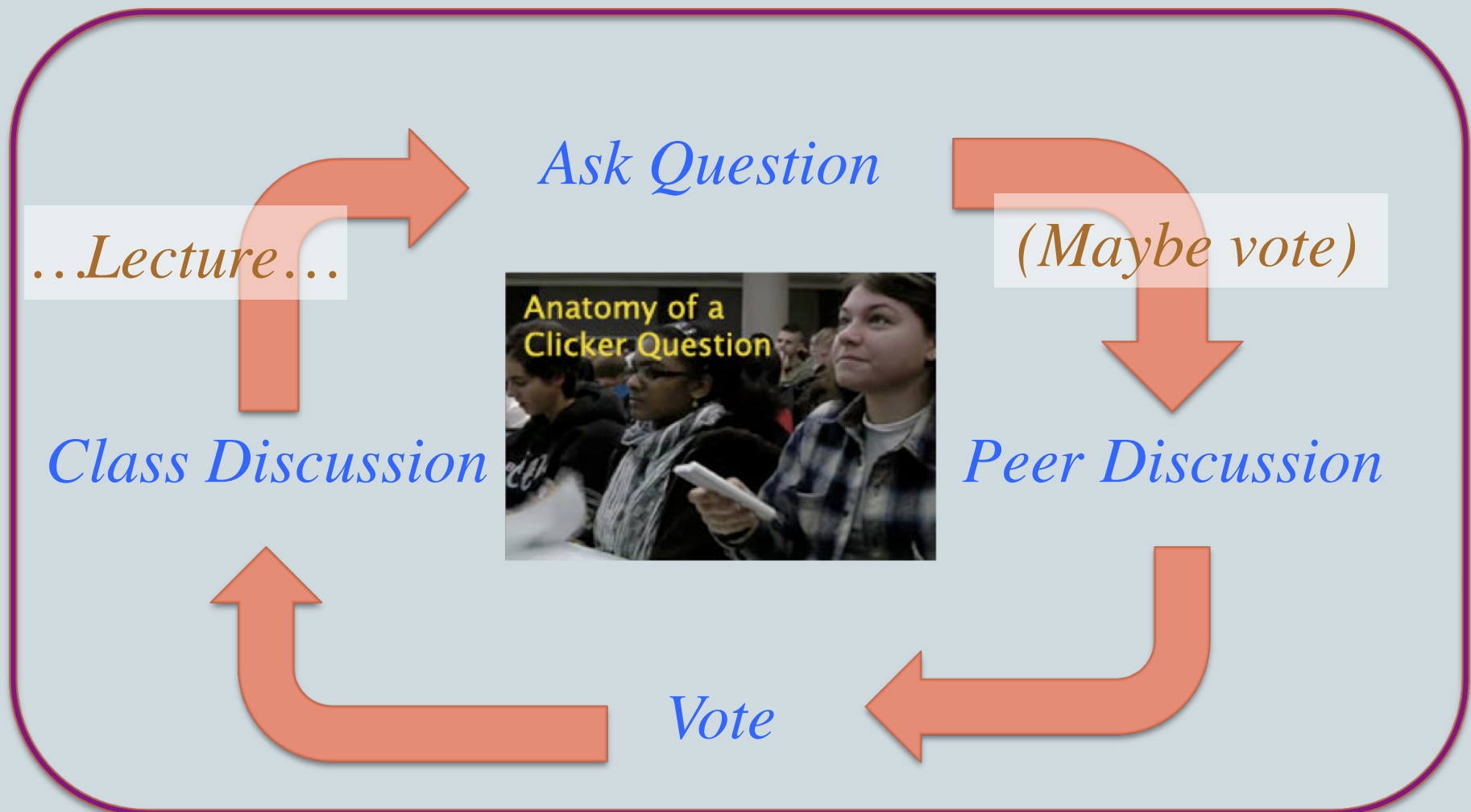
21

- Students prefer:
 - 2-5 questions
 - Interspersed
 - Peer discussion
- And we recommend:
 - Manual timing
 - Neighbors-only or informal groups



QUESTION BREAK

22

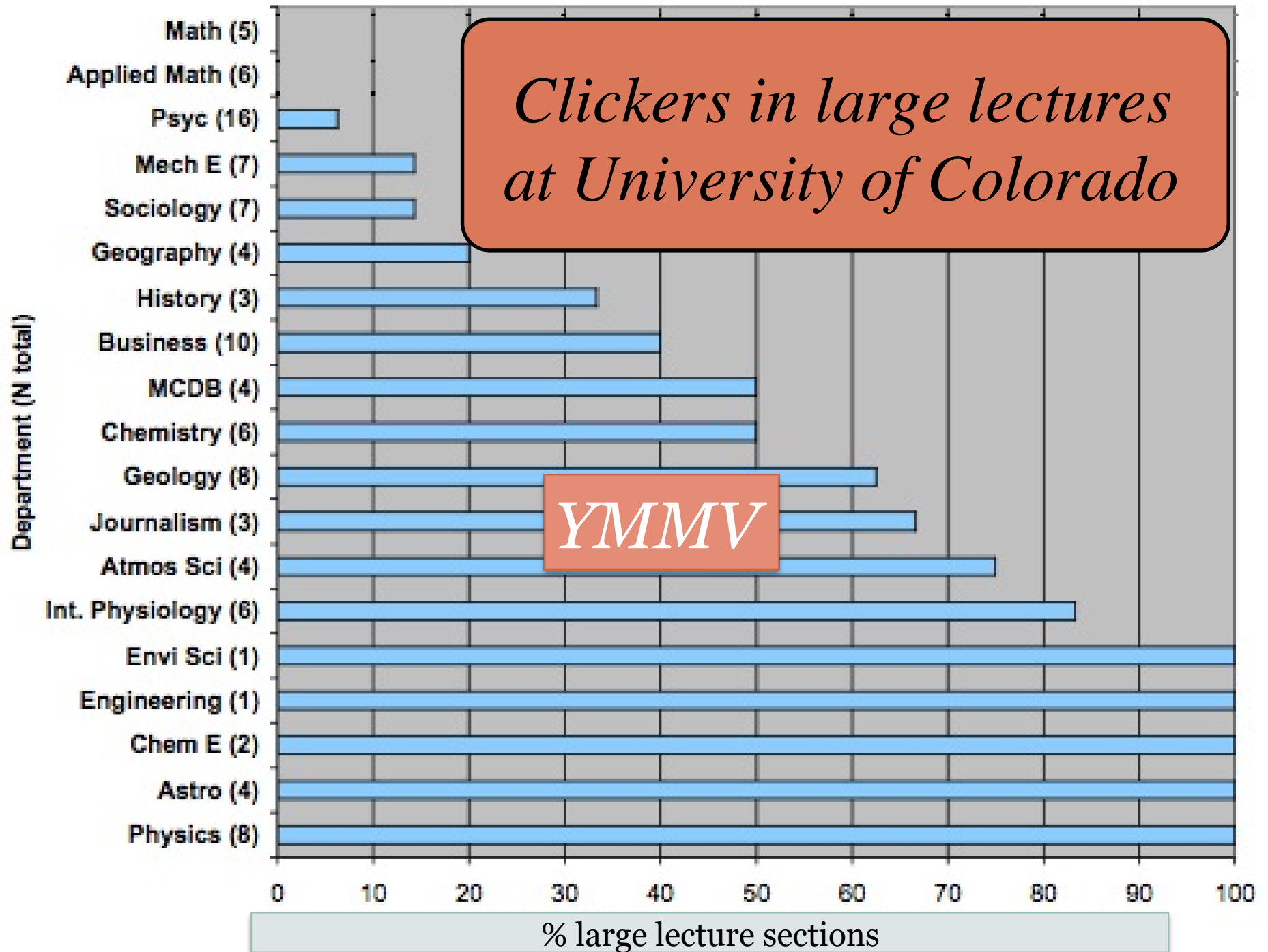


What is your *main* reason for wanting to use clickers?

23

- A) Motivate attendance (with points)
- B) Reinforce concepts by letting students practice
- C) Feedback to instructor
- D) Feedback to students
- E) Something else

*Clickers in large lectures
at University of Colorado*



Becoming a clicker expert

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Basic use of clickers...

- Only for quizzes or testing
- Only occasionally or at set times
- To check for basic comprehension

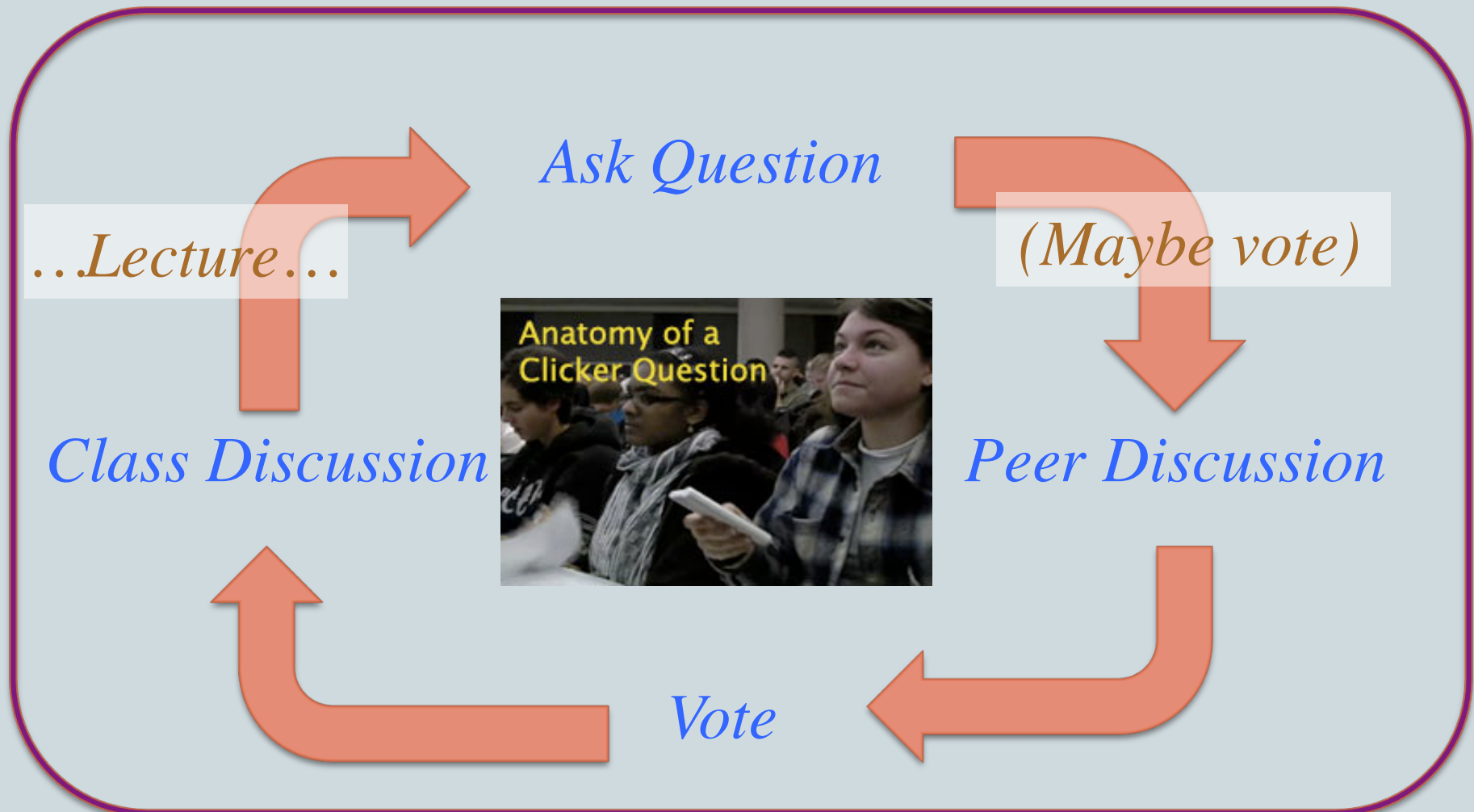
Better use of clickers...

- Frequent and integrated into class
- Require or encourage peer discussion
- Mix of difficulty
- Use results to direct instruction

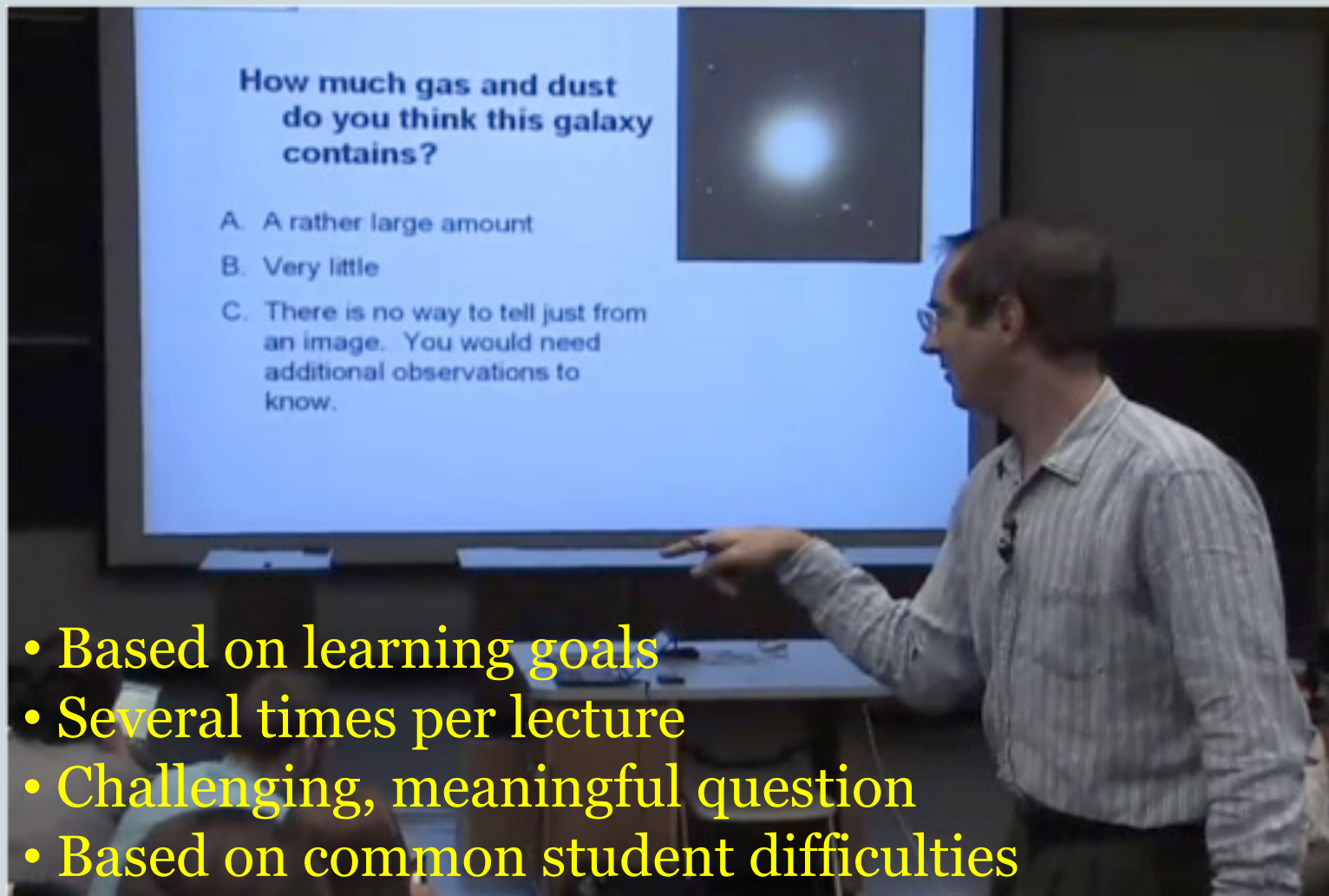
Handout

Anatomy of a clicker question

26



1. Ask Question



- Based on learning goals
- Several times per lecture
- Challenging, meaningful question
- Based on common student difficulties

2. Peer Discussion

28



- Students learn more deeply by teaching each other
- Makes them articulate answer
- Lets you see inside their heads

3. Vote

29



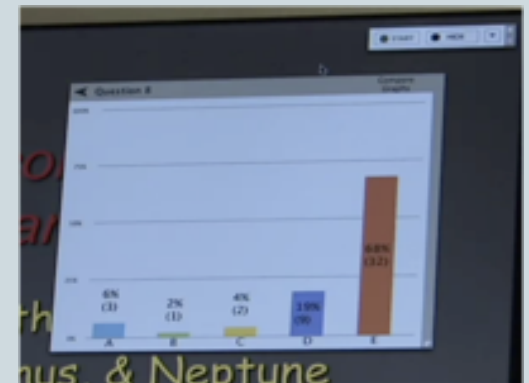
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4. Wrap-Up Discussion

30



- Consider whether to show the histogram immediately
- Ask multiple students to defend their answers
- Why are wrong answers wrong *and* why right answer is right



Let's try it



Which superpower would you rather have? The ability to...



- A. Change the mass of things
- B. Change the charge of things
- C. Change the magnetization of things
- D. Change the boiling point of things

This is an example of a “no one right answer” question. What is the goal? How “deep” is this question?

Amherst
media

A biology example: Concepts and misconceptions



A small acorn over time can grow into a huge oak tree. The tree can weigh many tons. **Where does most of the mass come from as the tree grows?**



- A) Minerals in the soil
- B) Organic matter in the soil
- C) Gases in the air
- D) Sunlight

What is the goal?
How “deep” is this question?

Language example: The right answer for the right reason



Is the following a run-on sentence?

“The sly fox sometimes jumped over the lazy dog unless it was Thursday.”

- A. Yes
- B. No
- C. Not sure

What is the goal?
How “deep” is this question?

Experience survey or in-class experiment

34

One of you will be randomly selected to be a winner!
Pick one:

- A. You can receive \$1.00 (cash) right now
- B. You can receive \$1.05 (cash) during the next meeting of this class

*Results: 66% of class took \$1 now (but
33% if \$1 on next to last day of class
instead of last day of class)*



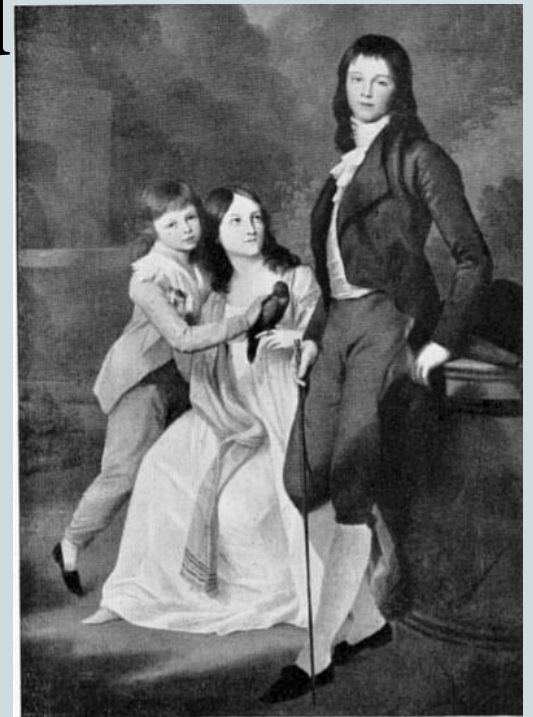
From DrJamesIII at <http://www.youtube.com/watch?v=CnnP0uCqD4k>

Math example: Calculation

35

If Leah is 6 years older than Sue, and John is 5 years older than Leah, and the total of all three of their ages is 41, how old is Sue?

- A. 8
- B. 10
- C. 14
- D. 19
- E. 21



What is the goal?
How “deep” is this question?

What is the goal of your question?

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Setting up instruction:

- Assess prior knowledge
- Provoke thinking about something new
- Stimulate discussion
- Predict-and-show
- Induce cognitive conflict

Develop Knowledge

- Elicit misconception
- Exercise skill
- Conceptual understanding

Assess Learning:

- Exit poll
- Probe limits of understanding
- Demonstrate success
- Review

Ian Beatty, U Mass

Which superpower would you rather have? The ability to...



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- B. Change the charge of things
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- D. Change the boiling point of things

Where does most of the mass come from as the tree grows?



- A) Minerals in the soil
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Instruction
knowledge
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What is the goal of your question?

37

BEFORE

Setting up instruction

Motivate

Which superpower would you rather have? The ability to...



- A. Change the mass of things
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- C. Change the magnetization of things
- D. Change the boiling point of things

Assess prior knowledge

AFTER

Assessing learning

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DURING

Developing knowledge

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Where does most of the mass come from as the tree grows?



- A) Minerals in the soil
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- D) Sunlight

Exercise skill

Elicit misconception

How “deep” is your question?

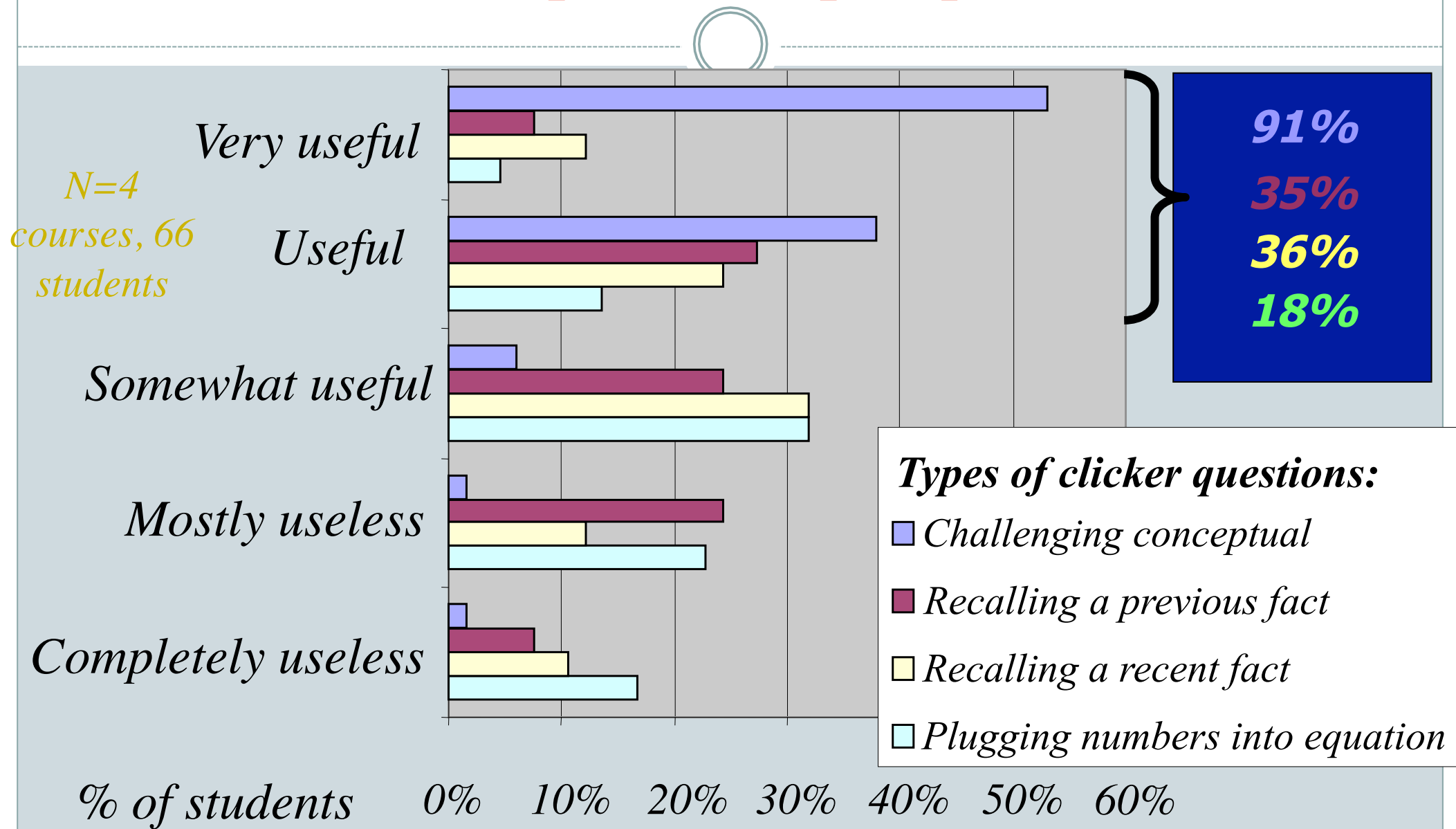
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I opened an online course on a topic I know nothing about, clicked through without reading anything, and took the assessment. I passed! What does that suggest?

- A. I am a genius!
- B. The assessment was too easy.
- C. Maybe the online course was too easy, too.
- D. More than one of the above

Adapted from: <http://blog.cathy-moore.com/2007/08/can-you-answer-these-6-questions-about-multiple-choice-questions/>


Students prefer deeper questions



A way to think about question depth: *Bloom's Taxonomy*

40

Which superpower would you rather have? The ability to...



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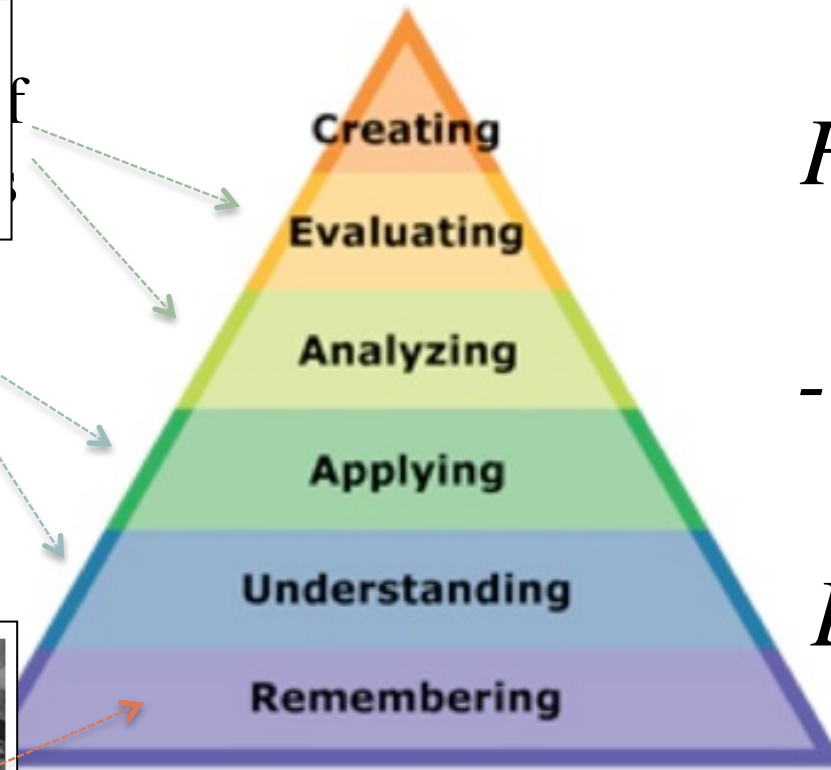
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- A. 8
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- C. 14
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Higher order

Lower order

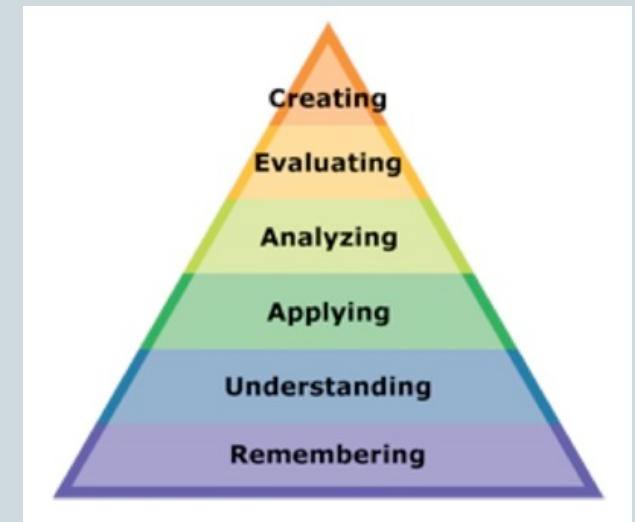
Do the questions you use intellectually challenge your students or simply assess their factual knowledge?

How to use Bloom's Taxonomy

41

Handout :
Bloom's Taxonomy

- Handout with handy verbs and question stems for different levels, e.g.:
 - UNDERSTAND: match, paraphrase, restate
 - APPLY: choose, explain, show
 - ANALYZE: compare, classify, categorize
 - EVALUATE: judge, criticize, defend
 - SYNTHESIS: combine, develop, design



A possible question-writing strategy



1. Pick a goal. Preparing / Developing/ Assessing.

Let's say I want to give my students a chance to try applying some ideas we've been learning about pressure.

2. Look for verbs at the right level

I use the Bloom's Taxonomy sheet to look for verbs at the right level. In this case, "Apply" has the verbs, "choose," "select," "sketch" or "predict." I like "predict."

3. Try writing a clear, targeted question.

Revise for wording. Consider common misconceptions.

I poke a hole in the bottom of a plastic water bottle. What will happen if I drop the bottle?

- A. The water will continue to pour out and down
- B. The water will continue to pour out, but the stream will aim straight out
- C. The water will just pour out more slowly, but still aimed down
- D. The water will no longer pour out



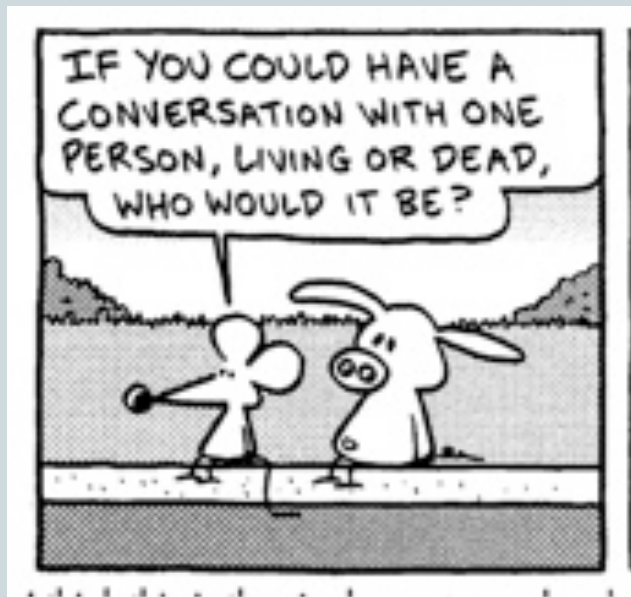
Due to the absence of pressure, the water will not pour out, so the answer is D. Research shows that having students predict the outcome of a demonstration before doing it increases their learning. This is an example of a discrepant event used in this style.

<http://www.physicslessons.com/demos.html>

Make Clickers Work for You, Dr. Stephanie Chasteen (CU-Boulder). Sponsored by i>clicker/Panopto

Two way conversations with students are vital...

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...because students can misunderstand what we say

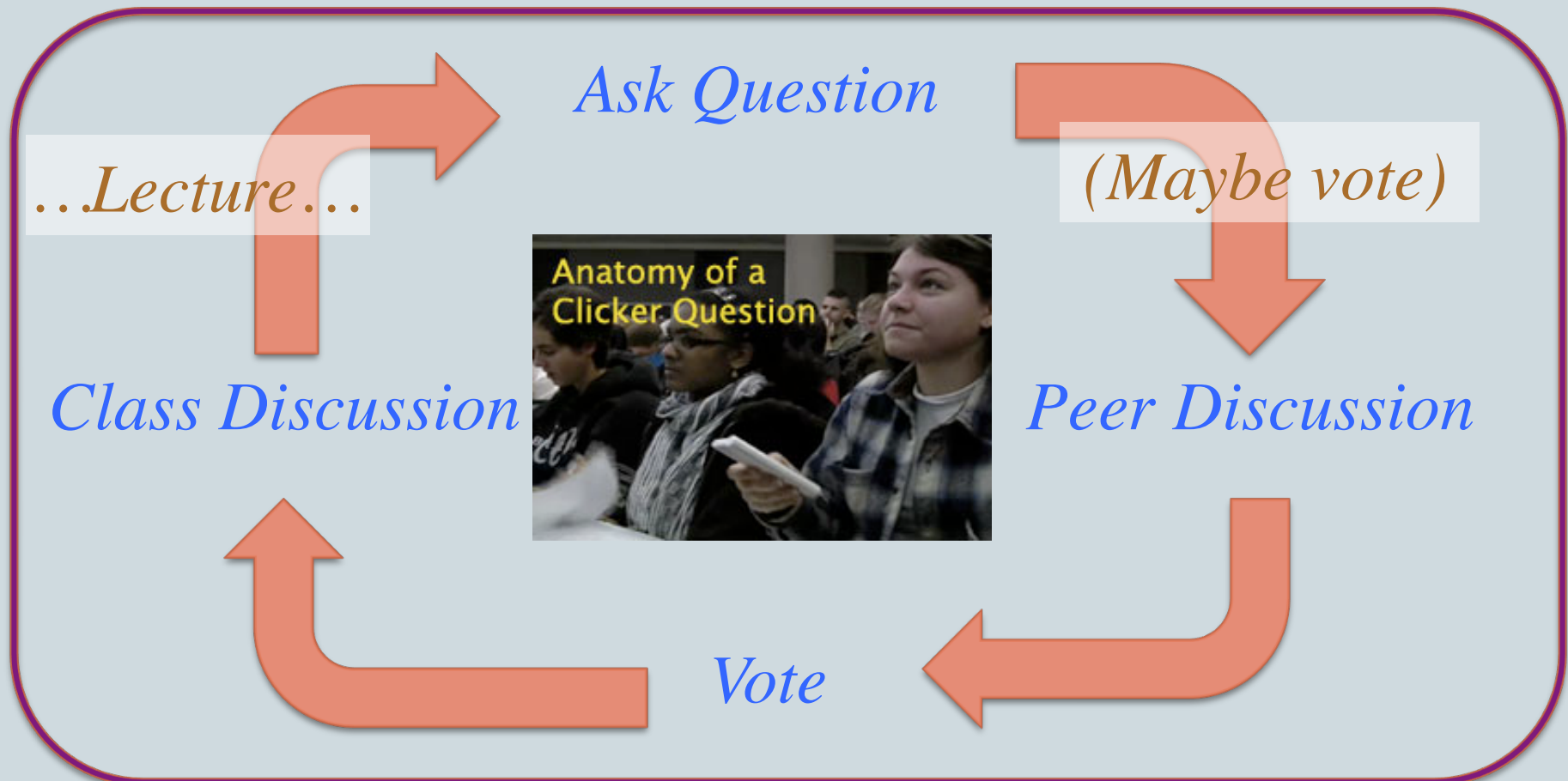
"Pearls Before Swine" by Stephan Pastis, 2002

CHAT DISCUSSION

What could possibly go wrong?

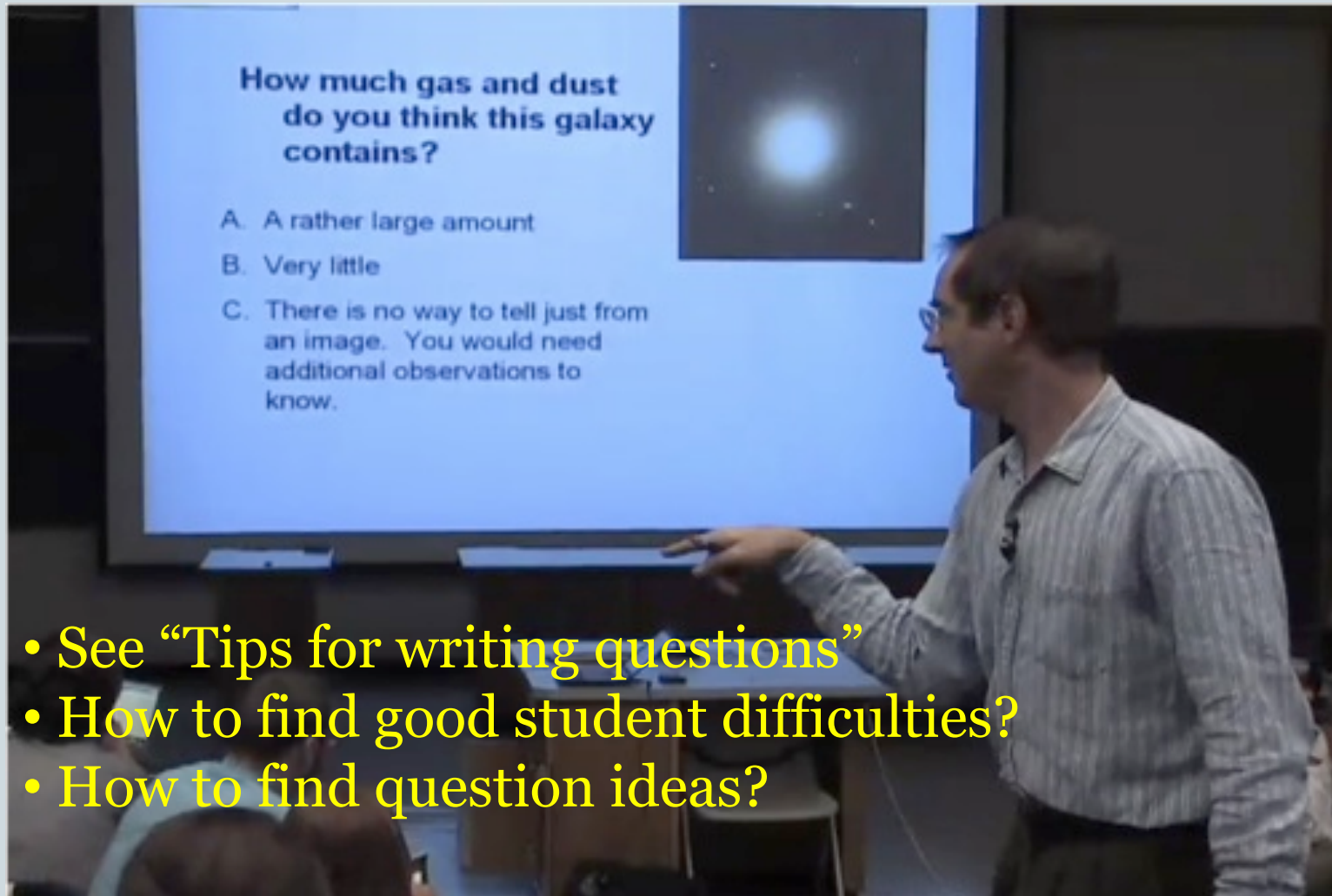
45

What are some of the **challenges** in using clickers and peer instruction? How might you overcome those challenges?



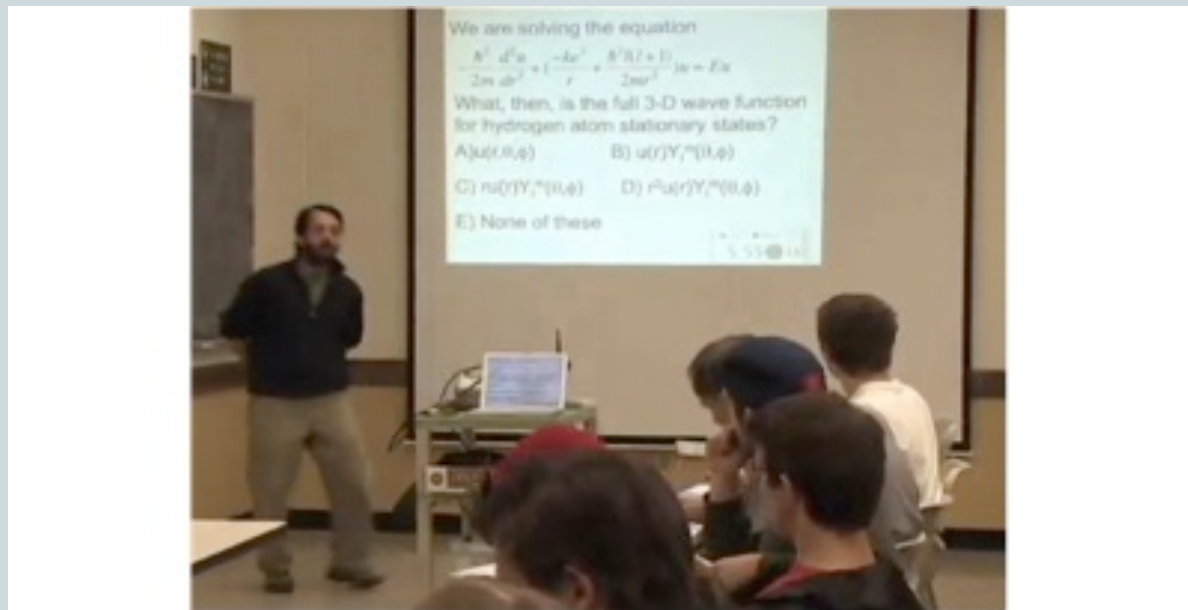
1. Ask Question

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- See “Tips for writing questions”
- How to find good student difficulties?
- How to find question ideas?

Example questions



Consider goals & depth

*How might some of these examples inform your own question writing?
Chat in backchannel too!*

A question idea:

In-class experiment

48

One of you will be randomly selected to be a winner!
Pick one:

- A. You can receive \$1.00 (cash) right now
- B. You can receive \$1.05 (cash) during the next meeting of this class

*Results: 66% of class took \$1 now (but
33% if \$1 on next to last day of class
instead of last day of class)*



From DrJamesIII at <http://www.youtube.com/watch?v=CnnP0uCqD4k>

A question idea: Are you done?

49

During a group or individual task:

Click in with your progress:

- A. Still working
- B. Almost done
- C. Finished

A question idea:
Real-time confusion meter

50

- A. I'm bored – speed up
- B. I'm with you
- C. Slow down a little
- D. I'm totally lost

A question idea:
Poll or opinion survey

51

If you saw a piece of trash in the street, would you pick it up?

- A. Yes
- B. No
- C. It depends

Example question: **Application of a principle**



Play students the “Jaws” theme after a break.

Is your reaction an example of operant or classical conditioning? Discuss with your neighbor.

(A) Yes

(B) No

(C) It depends



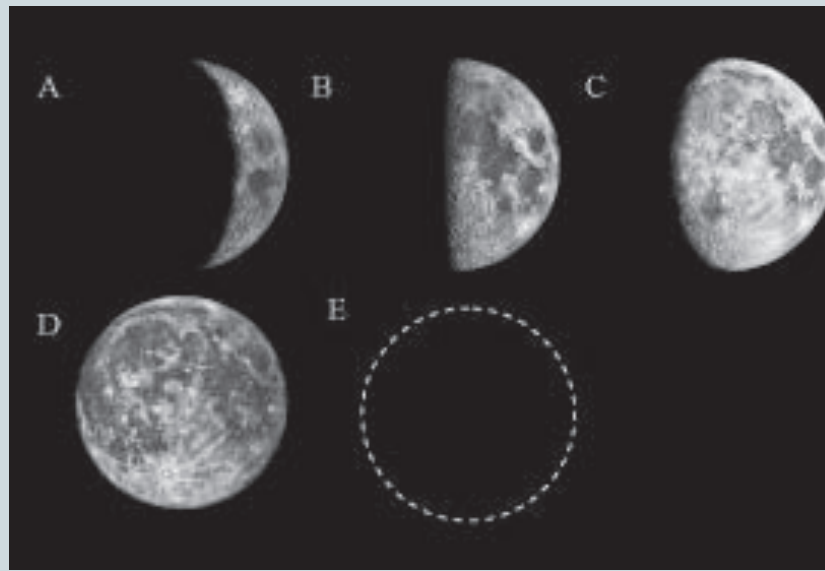
52

Example question:

Using visual representations

53

You look to the eastern horizon as the Moon is rising and discover that it is in the new moon phase. Later that same day when the moon is setting, which of the moon phases shown below would the Moon have looked like?



Center for Astronomy Education, Ed Prather

Example question: Demonstration prediction



Demonstration predictions.

For example, show that a light bulb lights up when it's connected to a power source through a weak acid.



What will happen if I use a 100% acid solution?

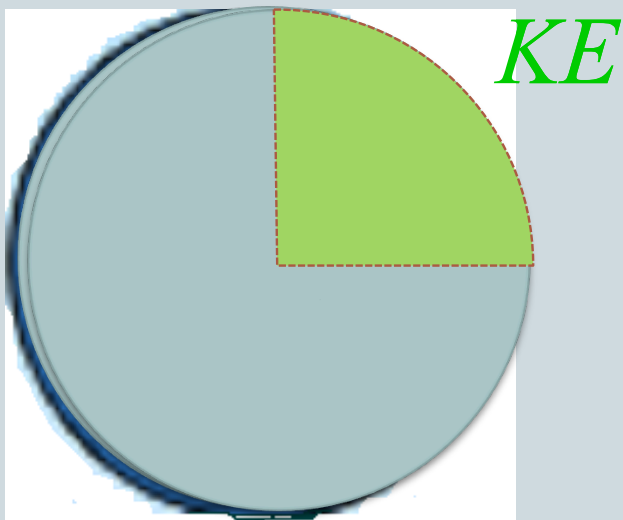
(A) Brighter (B) Dimmer

The answer ends up being opposite of what you'd expect!

Example question:

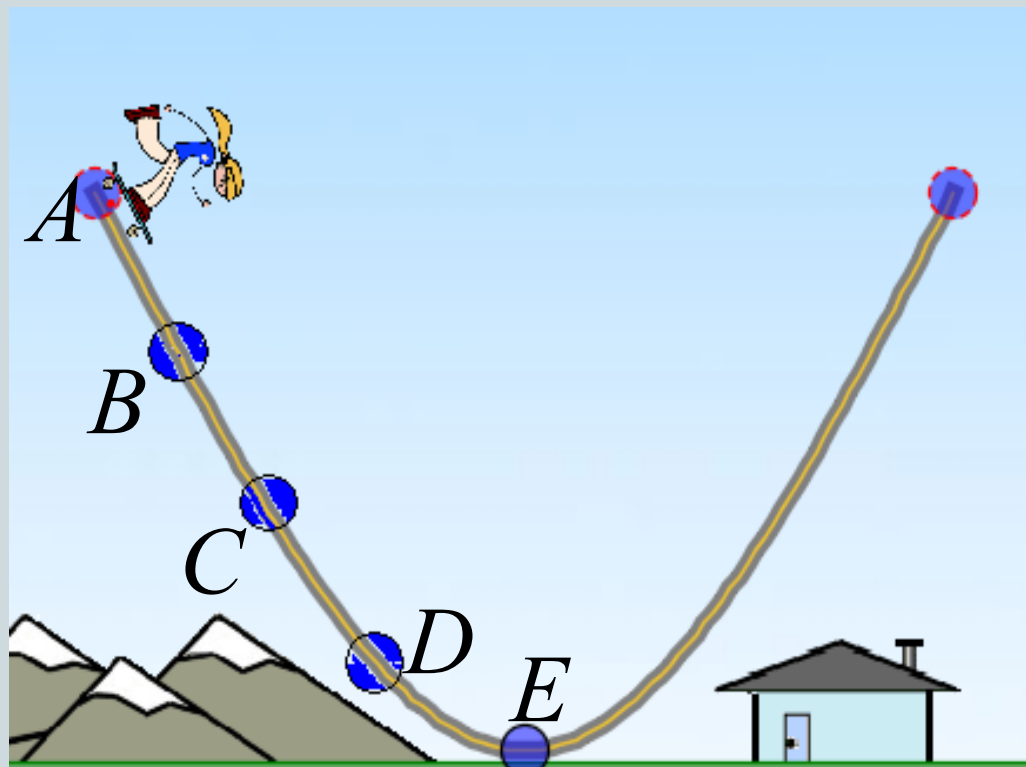
Analyze graph

The pie graph shows the energy of the Skater, where could she be on the track?



PE

KE

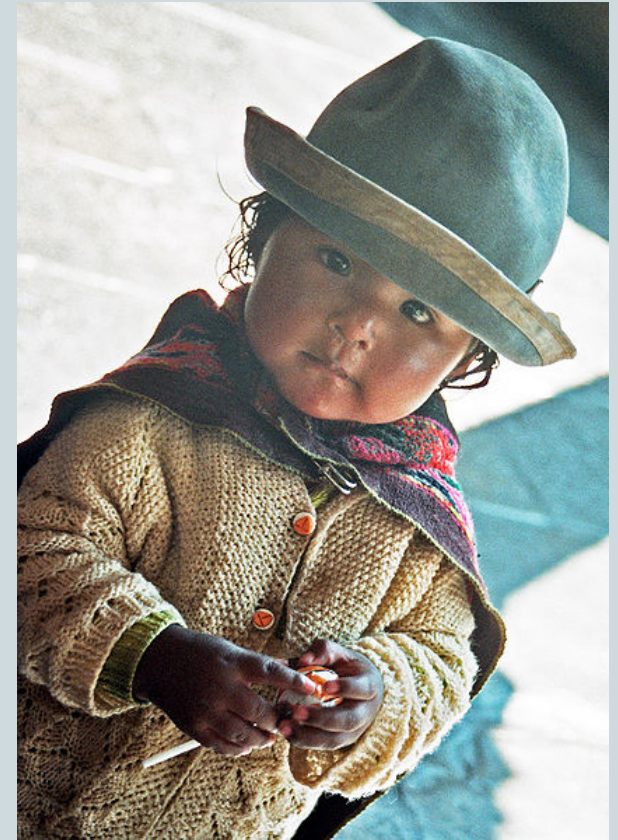


Example question: Reinforce vocabulary

56

La fille porte (*the girl is wearing*)

- A. Un chapeau (*a hat*)
- B. Des lunettes (*glasses*)
- C. Une casquette (*a cap*)
- D. Un manteau (*a coat*)
- E. Plus qu'un /
quelquechose d'autre
(*more than one/
something else*)



Tabetha Huth

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2. Peer Discussion

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- How to encourage student discussion?
- Circulate
- Give enough time
- Explain why you're doing this
- Respect ideas in wrap-up

Peer discussion: The research



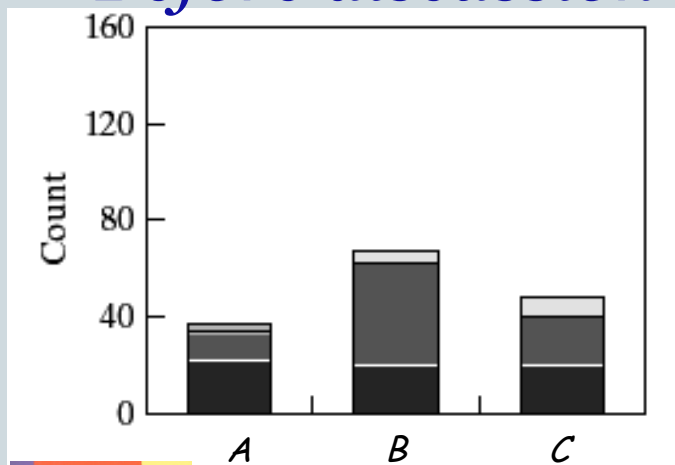
Students answer a clicker question individually



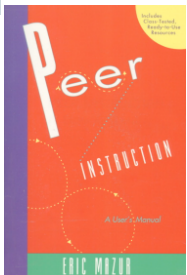
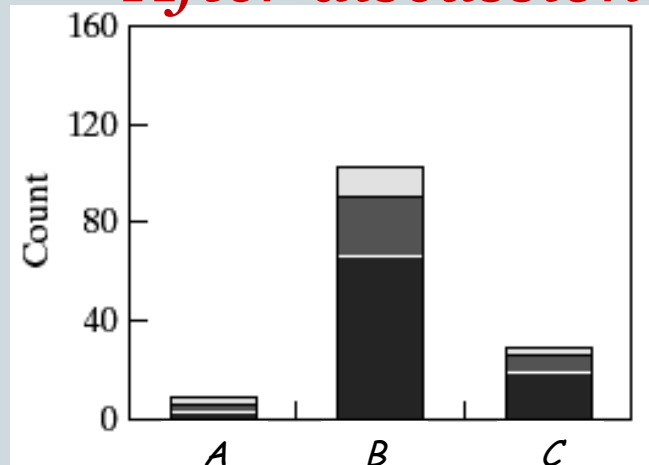
Students talk to neighbors and answer the same clicker question again



Before discussion



After discussion



Mazur, 1997

<http://vig-fp.prenhall.com/bigcovers/0135654416.jpg>

*Are students
learning?
OR
Are they being
told right answer?*

Are they learning from peers?



Students answer Q1 individually.



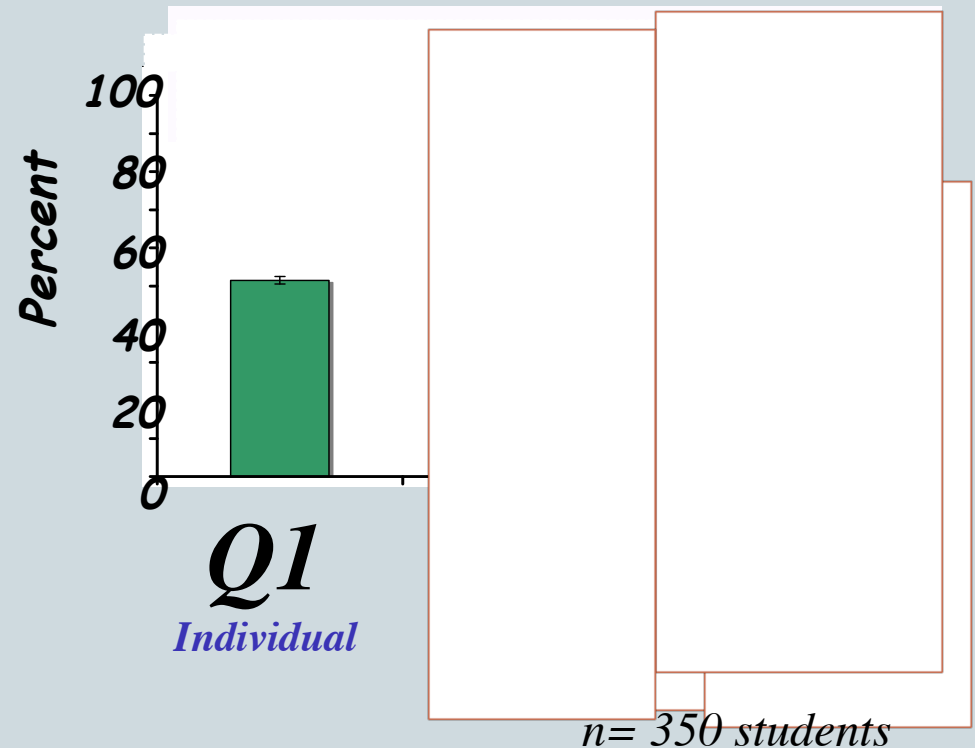
*Students talk to neighbors
and answer Q1 again
(Q1_{AD} = Q1 “After Discussion”).*



*Students answer Q2 individually .
Q2 tests same concept as Q1.*



Then explain answers to Q1 and Q2



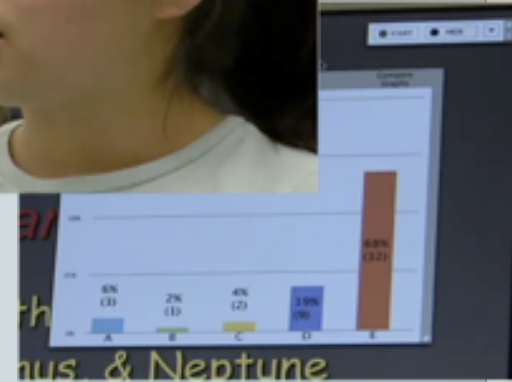
CU Faculty Researchers:

**More research at
STEMclickers.colorado.edu**

Smith et al., Science, 2009, 325(5910), 122.

4. Wrap-Up Discussion

60



- How to create a respectful climate for discussion?
- Consider whether to show the histogram immediately
- Ask multiple students to defend their answers
- Why are wrong answers wrong *and* why right answer is right

The Message:

The answer is NOT important.

The **strategy** for getting the answer is the goal.

The student must be convinced that
understanding *strategies* = high exam score.

BACKCHANNEL BREAK

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Tips for success

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- **Explain why** you're using clickers
- Use them **frequently**
- Ask questions at a **variety of levels** of difficulty
- Encourage **discussion** and listen to students
- Emphasize **reasoning**
- Use a **variety** of techniques and goals
- Start **small**

*Handout 1: Tips
for Success*

To Learn More...

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This short webinar can't do it all....

- **Watch classes** taught by expert users
- Find **mentors**, and form user groups
- **Videos** at <http://STEMvideos.colorado.edu>
- There are lots of great **books**
 - Teaching with Classroom Response Systems (Derek Bruff)
 - Peer Instruction (Eric Mazur)
 - Clickers in the Classroom (Douglas Duncan)
 - Clickers in Chemistry (Margaret Asirvatham)

Thank you!



- **Clickers resource page** (videos, question banks, workshops): <http://STEMclickers.colorado.edu>
- **Web and blog:** <http://sciencegeekgirl.com>
- **The Active Class blog:** <http://theactiveclass.com>.
- **Email:** stephanie@sciencegeekgirl.com

Upcoming travel to: SF Bay Area, LA, W. Virginia U., Pittsburgh, Chicago

*Look for the **Make Clickers Work for You** session recording,
and announcements of future webinars at
theactiveclass.com or our twitter stream **@iclickerclique***



Clickers *can* be used in ways that align with How People Learn



1. Motivation is essential for student learning



OR



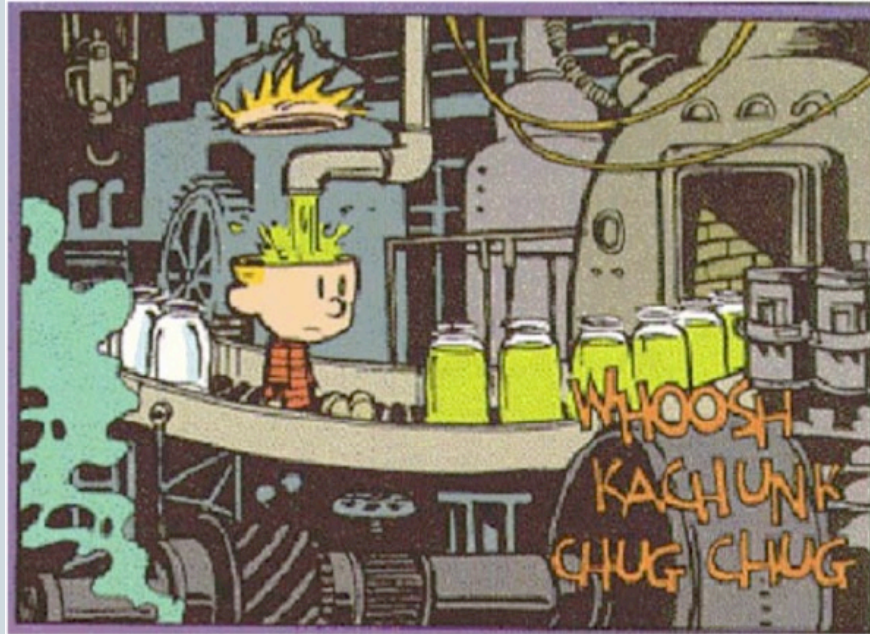
*Handout 4:
How People Learn*

Clickers *can* be used in ways that align with How People Learn

1. Motivation is essential for student learning
2. People learn by actively constructing their own understanding.

i.e., not this....

*So, this webinar
isn't enough!*



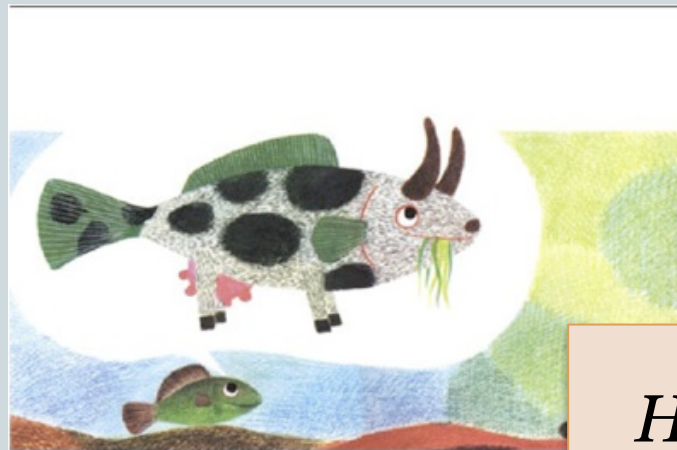
Handout 4:
How People Learn

Clickers *can* be used in ways that align with How People Learn



1. Motivation is essential for student learning
2. People learn by actively constructing their own understanding.
3. People learn by building on what they already know.

Fish is Fish
L. Lionni
Dragonfly
Books



Handout 4:
How People Learn

Clickers *can* be used in ways that align with How People Learn



1. Motivation is essential for student learning
2. People learn by actively constructing their own understanding.
3. People learn by building on what they already know.
4. People have a finite cognitive load



“Mr. Osborne, may I be excused? My brain is full.”

(c) Gary Larson, The Far Side

Handout 4:
How People Learn

How much do students learn the traditional way?

Basic physics force concept survey

0.6
0.5
0.4
0.3
0.2
0.1
0

traditional lecture

Take home message:

Students learn less than 25% of the most basic concepts (that they don't already know).

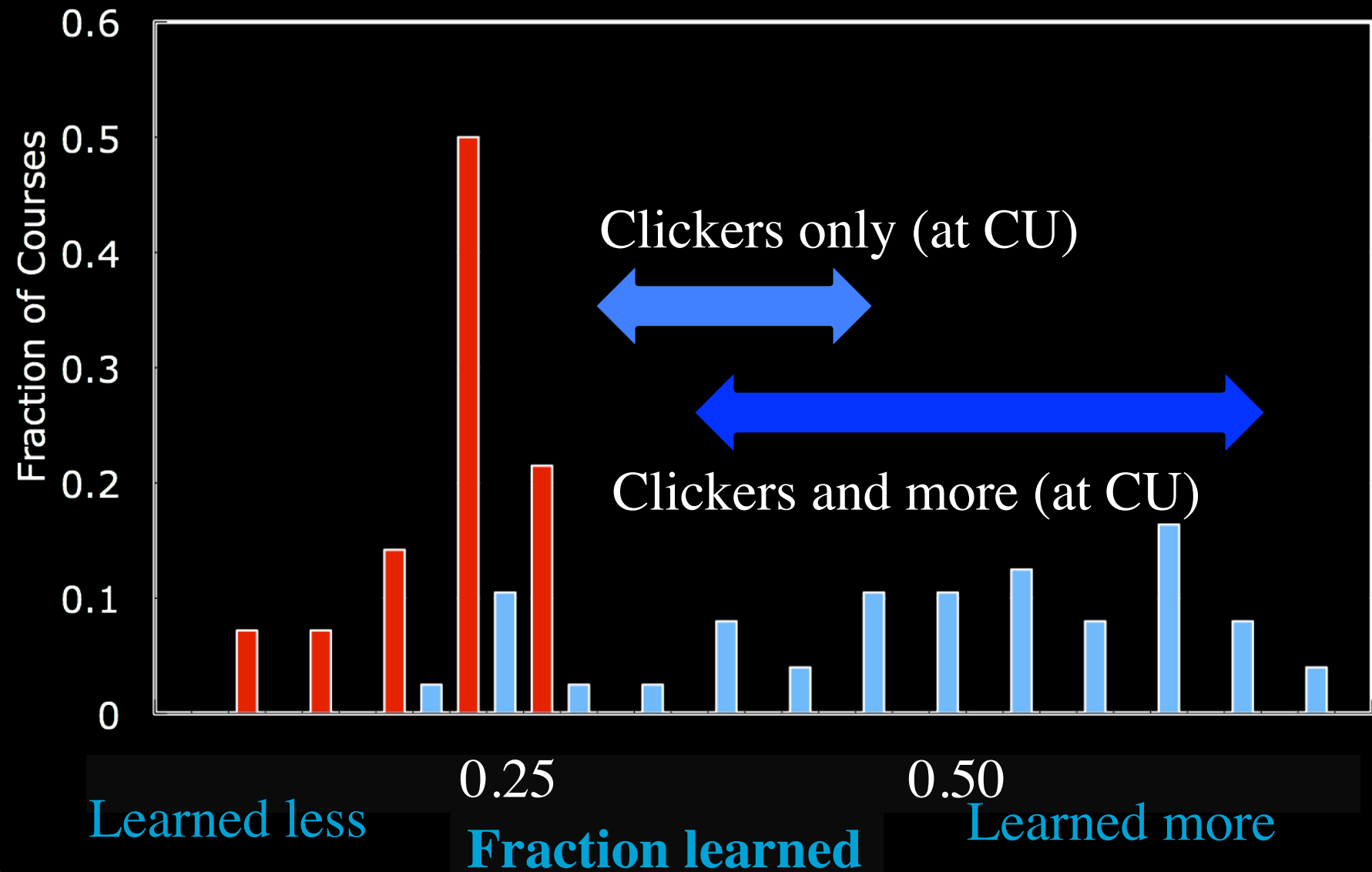
0.2
0.1
0

0.25 0.50
Learned less Fraction learned Learned more

But by actively engaging students...
based on what they know....

traditional lecture

interactive engagement



Peer discussion: The research



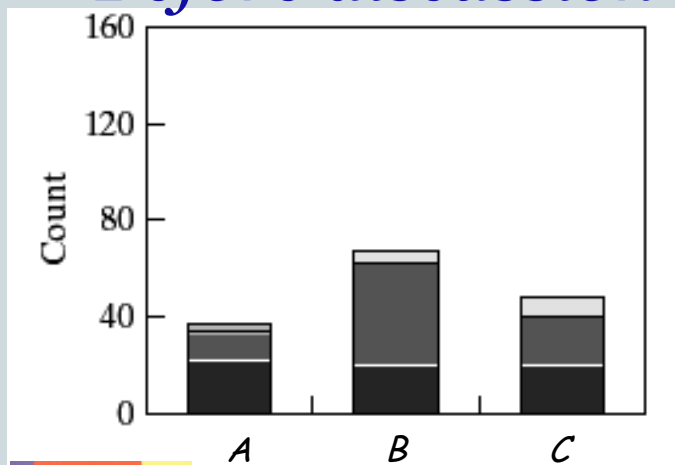
Students answer a clicker question individually



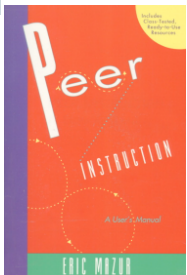
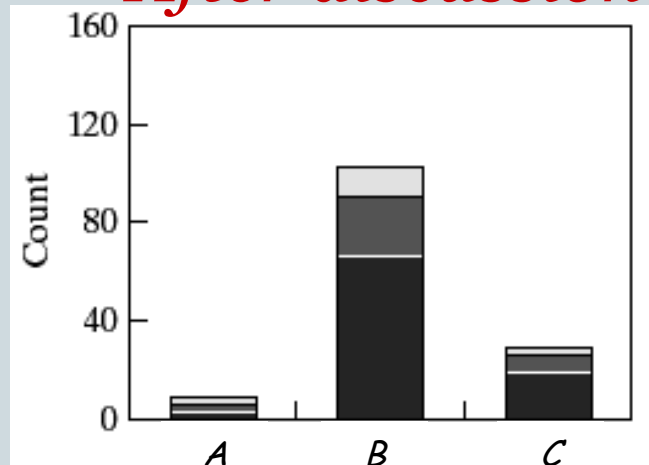
Students talk to neighbors and answer the same clicker question again



Before discussion



After discussion



Mazur, 1997

<http://vig-fp.prenhall.com/bigcovers/0135654416.jpg>

*Are students learning?
OR
Are they being told right answer?*

Are they learning from peers?



Students answer Q1 individually.



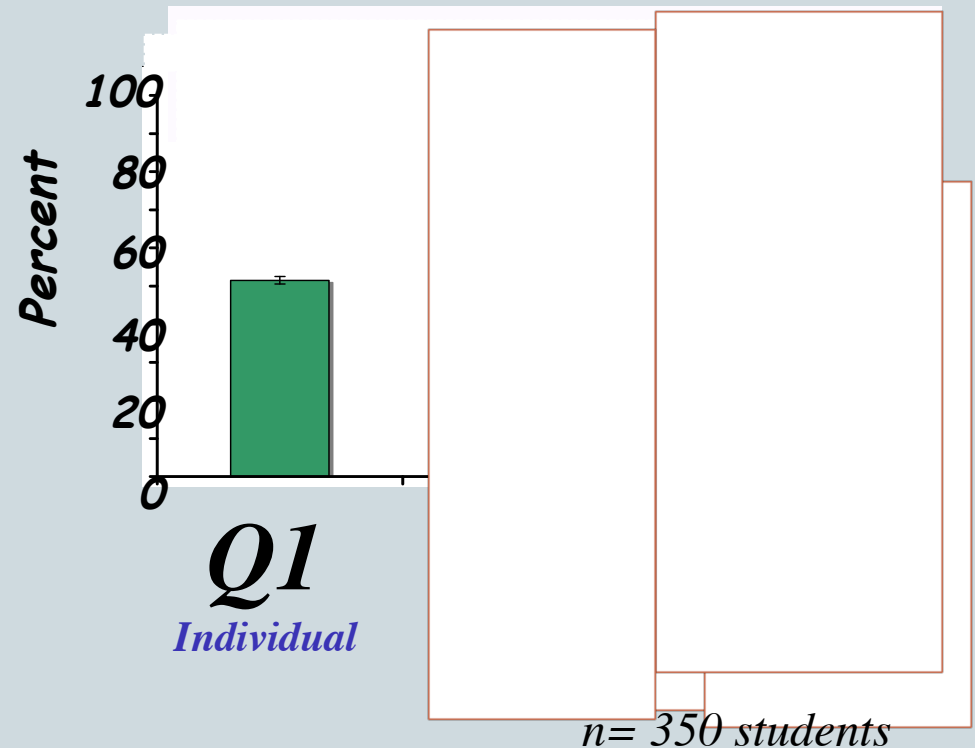
*Students talk to neighbors
and answer Q1 again
(Q1_{AD} = Q1 “After Discussion”).*



*Students answer Q2 individually .
Q2 tests same concept as Q1.*



Then explain answers to Q1 and Q2



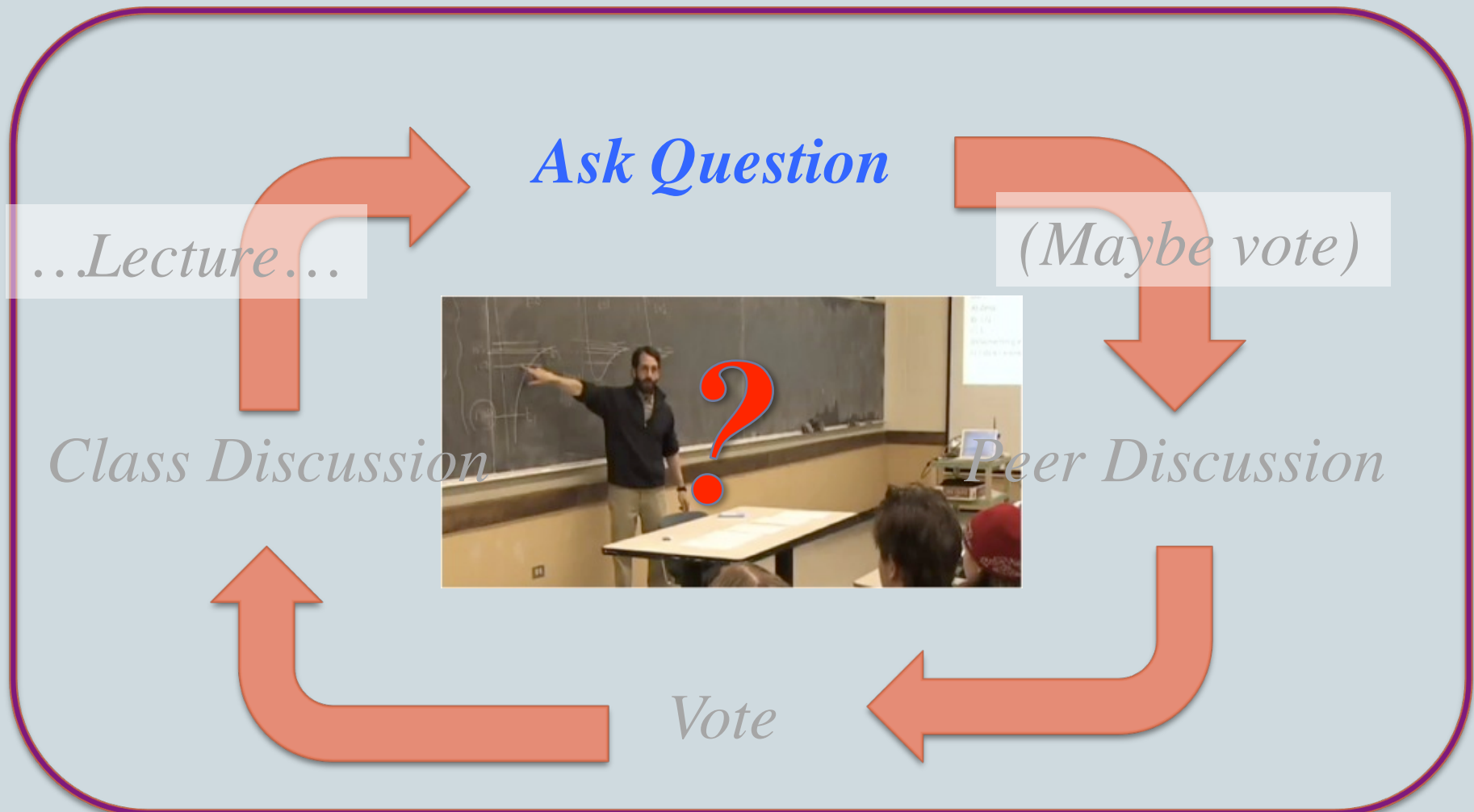
CU Faculty Researchers:

**More research at
STEMclickers.colorado.edu**

Smith et al., Science, 2009, 325(5910), 122.

Asking Questions

76



Question Writing Facets

77

1. Question Mechanics
2. Question Depth
3. Question Goals

Handout 5:
Writing Questions

Question Writing Facets

78

- 1. Question Mechanics**
- 2. Question Depth**
- 3. Question Goals**

Question Writing *Mechanics*

79

- Clear wording
- Use tempting distractors
- Sources of distractors:
 - Student answers on homework & exams
 - Common misconceptions

Question Writing *Mechanics*

80

When is it NOT a good idea to avoid negative questions?

- A. Never
- B. Sometimes
- C. Always
- D. What?

Adapted from: <http://blog.cathy-moore.com/2007/08/can-you-answer-these-6-questions-about-multiple-choice-questions/>

Question Writing Facets

81

1. Question Mechanics
- 2. Question Depth**
3. Question Goals

Question Writing Depth

*N=4
courses, 66
students*

Very useful

Useful

Somewhat useful

Mostly useless

Completely useless

% of students 0% 10% 20% 30% 40% 50% 60%

Types of clicker questions:

- *Challenging conceptual*
- *Recalling a previous fact*
- *Recalling a recent fact*
- *Plugging numbers into equation*

91%

35%

36%

18%

But how do we increase the level of questioning?

Question Writing *Depth*

84

Back to Bloom's Taxonomy

- Handout with handy verbs and question stems for different levels, e.g.:
 - UNDERSTAND: match, paraphrase, restate
 - APPLY: choose, explain, show
 - ANALYZE: compare, classify, categorize
 - EVALUATE: judge, criticize, defend
 - SYNTHESIS: combine, develop, design

Handout 6:
Bloom's Taxonomy



Question Writing Facets

85

1. Question Mechanics
2. Question Depth
3. Question Goals

Setting up instruction:

- Assess prior knowledge
- Provoke thinking about
- Stimulate discussion
- Predict-and-show
- Induce cognitive conflict

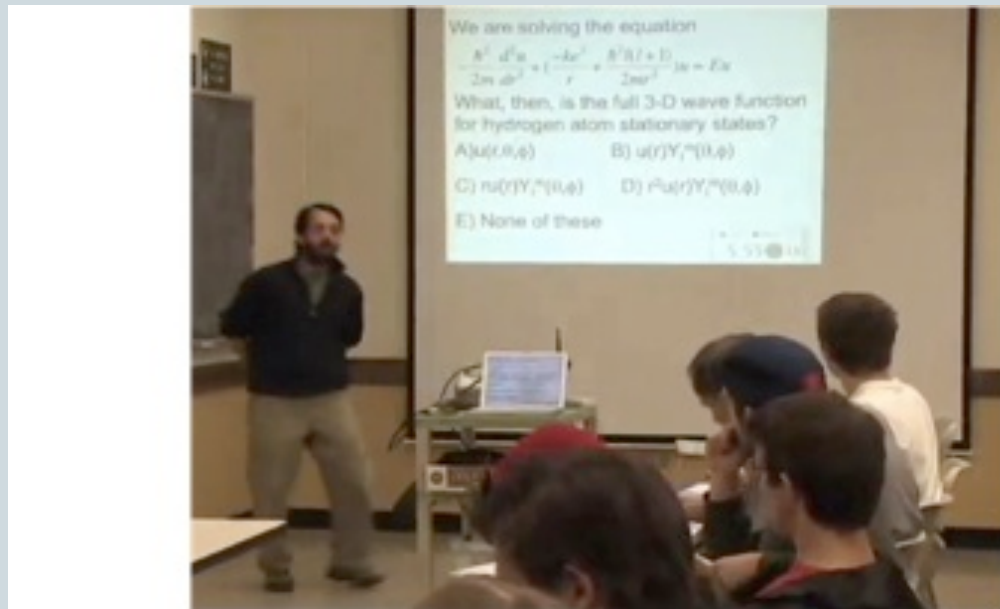
Develop Knowledge

• Elicit misperceptions

Assess Learning:

- Exit poll
- Probe limits of understanding
- Demonstrate success
- Review

Example questions



Consider...

1. Mechanics
2. Depth
3. Goals

*How might some of these examples
inform your own question writing?
Chat in backchannel too!*

Handout 6:
TEFA question examples

A question idea:

In-class experiment

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One of you will be randomly selected to be a winner!
Pick one:

- A. You can receive \$1.00 (cash) right now
- B. You can receive \$1.05 (cash) during the next meeting of this class

*Results: 66% of class took \$1 now (but
33% if \$1 on next to last day of class
instead of last day of class)*



From DrJamesIII at <http://www.youtube.com/watch?v=CnnP0uCqD4k>

A question idea: Are you done?

88

During a group or individual task:

Click in with your progress:

- A. Still working
- B. Almost done
- C. Finished

A question idea:
Real-time confusion meter

89

- A. I'm bored – speed up
- B. I'm with you
- C. Slow down a little
- D. I'm totally lost

A question idea:
Poll or opinion survey

90

If you saw a piece of trash in the street, would you pick it up?

- A. Yes
- B. No
- C. It depends

Example question:
Application of a principle

Play students the “Jaws” theme after a break.

Is your reaction an example of operant or classical conditioning? Discuss with your neighbor.

(A) Yes

(B) No

(C) It depends



Consider...

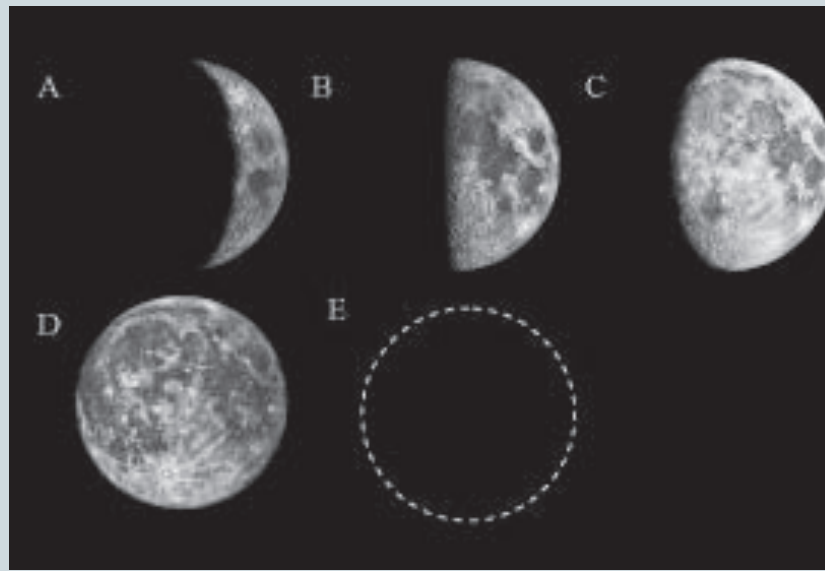
1. Mechanics
2. Depth
3. Goals

Example question:

Using visual representations

92

You look to the eastern horizon as the Moon is rising and discover that it is in the new moon phase. Later that same day when the moon is setting, which of the moon phases shown below would the Moon have looked like?



Consider...

1. Mechanics
2. Depth
3. Goals

Center for Astronomy Education, Ed Prather

Example question: Demonstration prediction

Demonstration predictions.

For example, show that a light bulb lights up when it's connected to a power source through a weak acid.

What will happen if I use a 100% acid solution?

(A) Brighter (B) Dimmer



Consider...

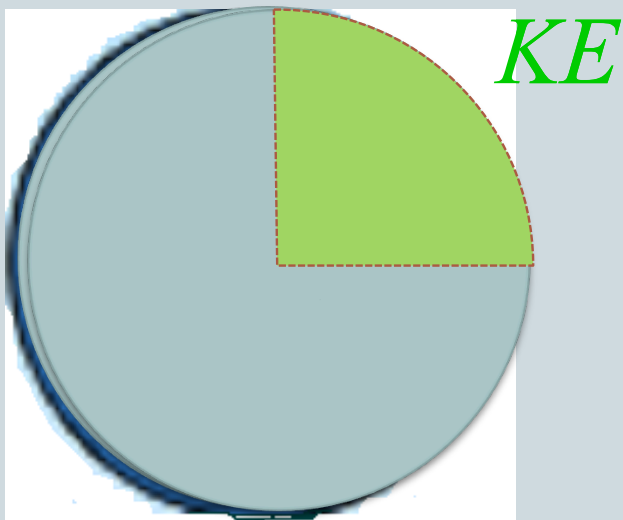
1. Mechanics
2. Depth
3. Goals

The answer ends up being opposite of what you'd expect!

Example question:

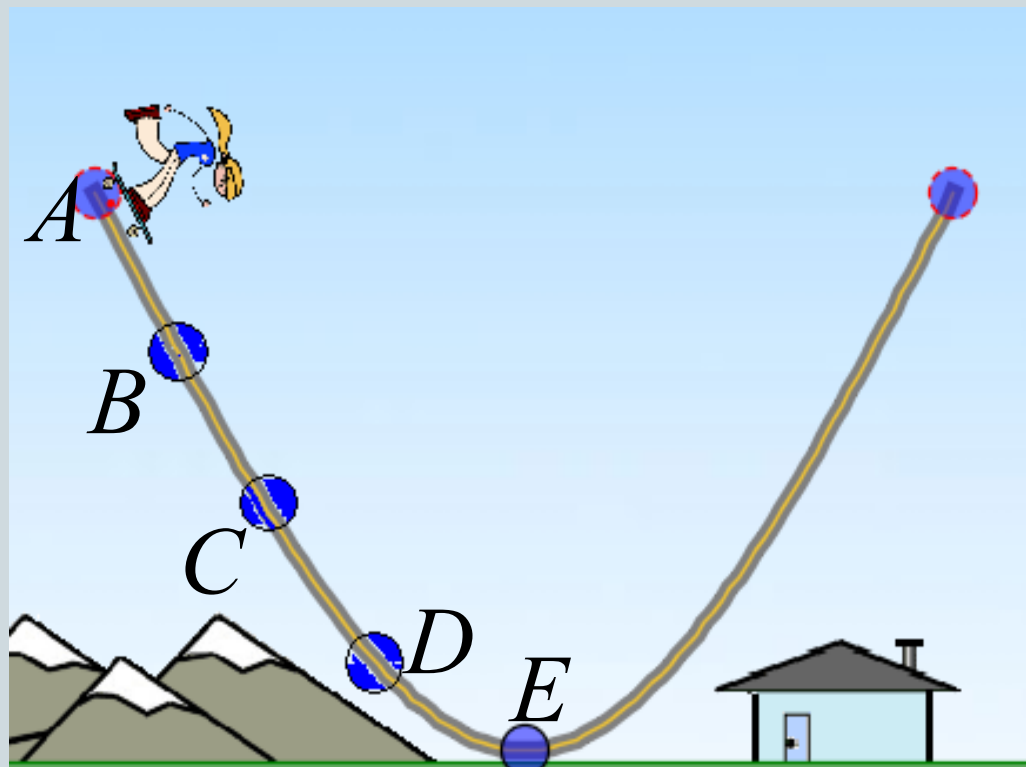
Analyze graph

The pie graph shows the energy of the Skater, where could she be on the track?



PE

KE

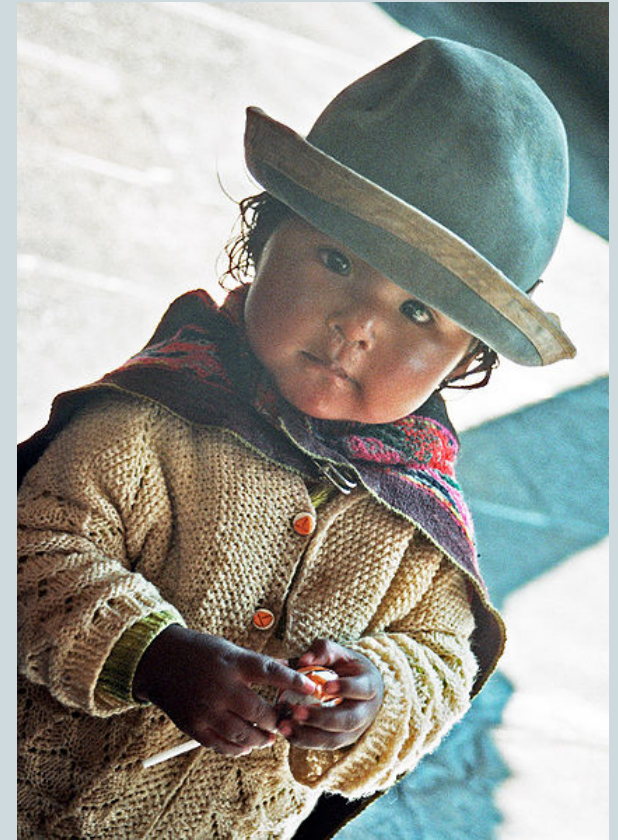


Example question: Reinforce vocabulary

95

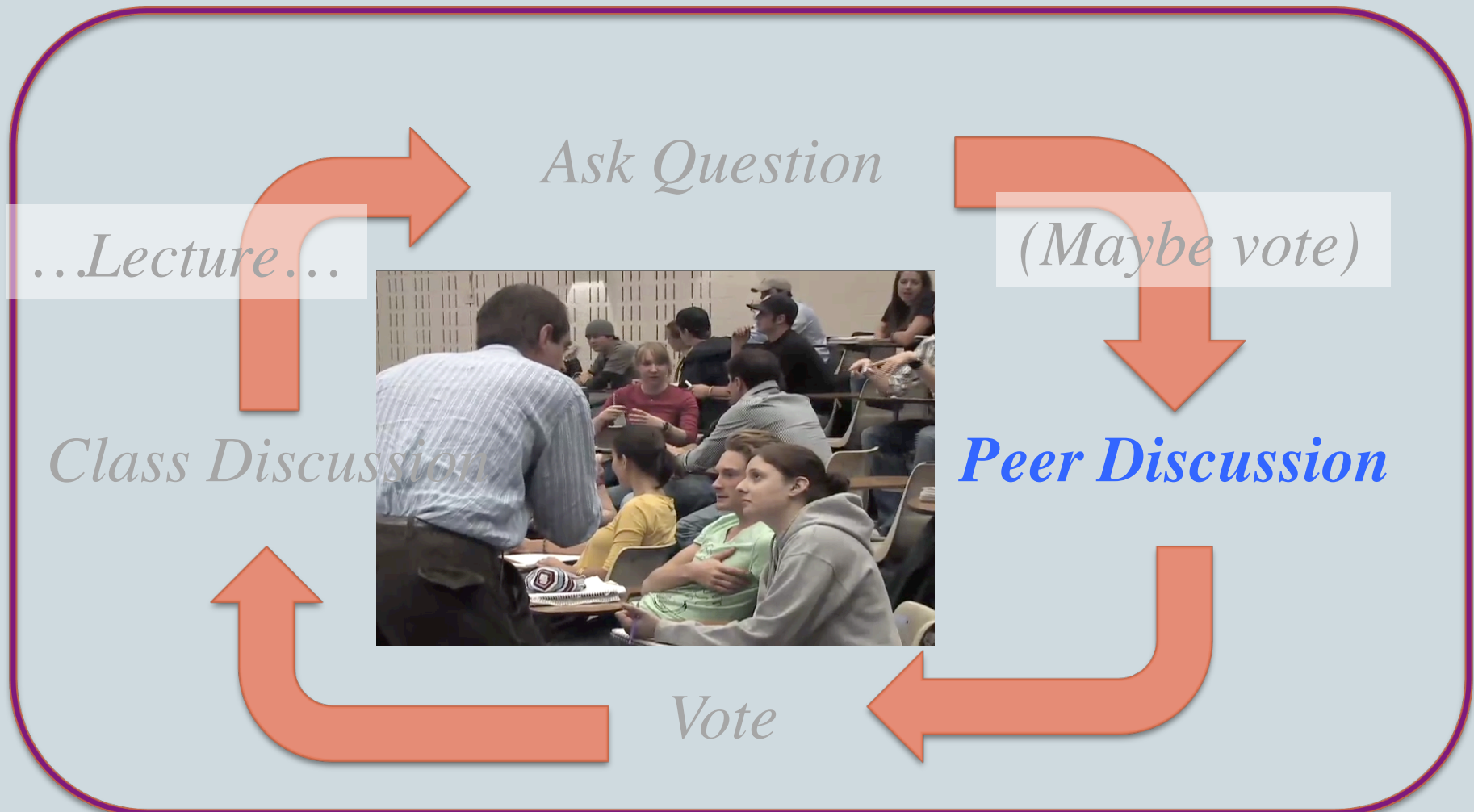
La fille porte (*the girl is wearing*)

- A. Un chapeau (*a hat*)
- B. Des lunettes (*glasses*)
- C. Une casquette (*a cap*)
- D. Un manteau (*a coat*)
- E. Plus qu'un /
quelquechose d'autre
(*more than one/
something else*)



Tabetha Huth

95

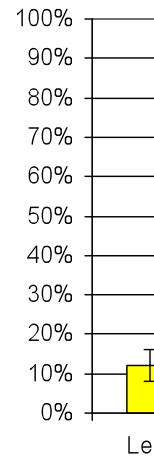


What decisions do you have?

Peer Instruction Stage

Discussion

Percent of Questions



C. Turpen and N.D. Finkelstein, "Not all interactive engagement is the same: Variations in Physics professors' implementation of Peer Instruction." Phys. Rev. ST Physics Ed. Research 5, 020101.

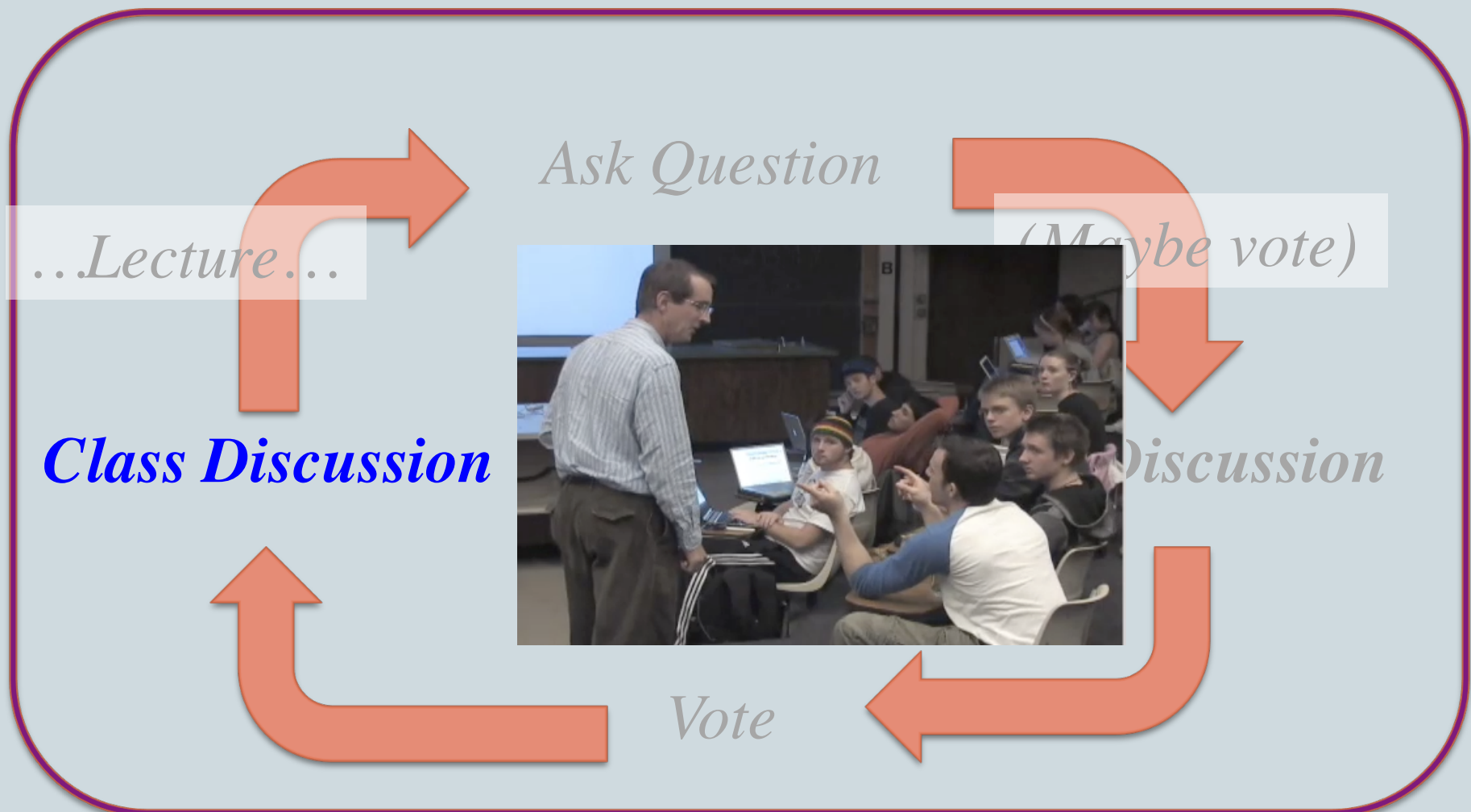
Make Clickers Work for You, David Hestenes, University of Colorado, Boulder, Colorado, 1992. Sponsored by the National Science Foundation.

Peer discussions

98

- What are the practices that the instructor can change during peer discussion?
- Allow **plenty of time** for discussion
- **Encourage** discussion
- **Circulate** classroom (to listen in)

*Handout 7: Peer
Discussion*



Whole-class Discussion

- What are the practices that the instructor can change during whole class discussion?
- **Do not reveal the answer** immediately
- **Hide the histogram** until after discussion
- **Hear arguments** from students (more than one!)
- Hear arguments for right **and wrong answers**
- Make sure students know correct answer and reasoning by the end

Giving the answer stops student thinking!

More “how to” tips...

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SEI Clicker and Education Videos



Videos produced by the University of Colorado Science Education Initiative (CU-SEI) and the University of British Columbia Carl V Science Education Initiative (CWSEI).



An instructor's guide to the effective use of personal response systems ("clickers") in teaching

» [Back to the main Clickers page](#)

Click on links to play, or right-click and choose 'save ... as' to download

CLICKERS IN THE SCIENCE CLASSROOM		
	<p>Clickers: Students and Teachers Speak</p> <p>Instructors and students describe the benefits of clicker use in class when used to actively engage the students and get them thinking about the material.</p> <p>(approx. 4.5 min)</p>	<p>Play video:</p> <p>Flash</p> <p>QuickTime</p> <p>Windows Media</p> <p>YouTube</p>
	<p>How to Use Clickers Effectively</p> <p>Want to know more about just <i>how</i> to use clickers to best help your students learn? This video shares the best practices in clicker use, including tips on writing questions and getting students to talk about them, the finer points of running a class discussion about a question, and</p>	<p>Flash</p> <p>QuickTime</p> <p>Windows Media</p>

<http://STEMvideos.colorado.edu>

Make Clickers Work for You, *Dr. Stephanie Chasteen (CU-Boulder)*. Sponsored by i>clicker/Panopto

Tips for success

103

- **Explain why** you're using clickers
- Use them **frequently**
- Ask questions at a **variety of levels** of difficulty
- Encourage **discussion** and listen to students
- Emphasize **reasoning**
- Use a **variety** of techniques and goals
- Start **small**

*Handout 1: Tips
for Success*

To Learn More...

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This short webinar can't do it all....

- **Watch classes** taught by expert users
- Find **mentors**, and form user groups
- **Videos** at <http://STEMvideos.colorado.edu>
- There are lots of great **books**
 - Teaching with Classroom Response Systems (Derek Bruff)
 - Peer Instruction (Eric Mazur)
 - Clickers in the Classroom (Douglas Duncan)
 - Clickers in Chemistry (Margaret Asirvatham)

Thank you!



- **Clickers resource page** (videos, question banks, workshops): <http://STEMclickers.colorado.edu>
- **Web and blog:** <http://sciencegeekgirl.com>
- **The Active Class blog:** <http://theactiveclass.com>.
- **Email:** stephanie@sciencegeekgirl.com

Upcoming travel to: SF Bay Area, LA, W. Virginia U., Pittsburgh, Chicago

*Look for the **Make Clickers Work for You** session recording,
and announcements of future webinars at
theactiveclass.com or our twitter stream **@iclickerclique***